




- 27 -

**DR. BABASAHEB AMBEDKAR  
MARATHWADA UNIVERSITY,  
AURANGABAD.**



**Curriculum of**  
**BACHELOR OF COMPUTER APPLICATION**  
**(BCA)**  
**1ST YEAR**  
**under Choice Based Credit & Grading System**  
**SEMESTER FIRST**  
  
*[ Effective from the Academic Year 2018-19 & onwards ]*

  
Co-ordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.

  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



Circular file

- 22 -

**DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY**



**CIRCULAR NO.SU/BCA/CBC & GS/15/2018**

In Supersession of the Circular No. Su/BCA/CBC & GS/12/2018 18062-312 dated 20-8-2018 along with the syllabi of first to third year. It is further informed to all concerned that, **As decided by the Academic Council held on 30-06/02-07-2018 the syllabi of BCA Ist Year, Semester Ist as circulated earlier vide No.su/2018/14151-551 dated 17-07-2018 is remained unchanged and uploaded on the University web site [www.bamu.ac.in](http://www.bamu.ac.in).**

This is effective from the Academic Year 2018-2019 and onwards

Kindly take a note of this circular and bring notice to the students, teachers and staff for their information and necessary action.

University Campus,  
Aurangabad-431 004.

REF.NO.SU/MGT/2018-19/ 18358 - 18608

Date:- 31-08-2018.

\*

\*

\*

\*

\*\*\*\*\*

*[Signature]*  
**Deputy Registrar,  
Syllabus Section.**

**Copy forwarded with compliments to :-**

- 1] **The Principals, affiliated concerned Colleges, Dr. Babasaheb Ambedkar Marathwada University.**
- 2] **The Director, University Network & Information Centre, UNIC, with a request to upload this Circular on University Website.**

**Copy to :-**

- 1] The Director, Board of Examinations & Evaluation,
- 2] **The Section Officer, [ B.Com.Unit ] Examination Branch,**
- 3] The Section officer, [Eligibility Unit],
- 4] **The Programmer [Computer Unit-1] Examinations,**
- 5] **The Programmer [Computer Unit-2] Examinations,**
- 6] The In-charge, [E-Suvidha Kendra],
- 7] The Public Relation Officer,
- 8] The Record Keeper,

*[Signature]*  
**Co-ordinator**

**Modern College of Computer Science & I.T.,  
Aurangabad.**

*[Signature]*  
**IC Principal  
Modern Coll. of Computer Science & I.T.,  
Aurangabad.**



DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD.

FACULTY OF MANAGEMENT SCIENCE.

Syllabus - Bachelor of Computer Application (BCA)

Choice Based Credit System (CBCS) - 2018-19

Semester & Credits	Core Course [04]	Ability Enhancement Compulsory Courses [AEC] [01]	Discipline Specific Elective [DSE] [01]
I Credit 24	1. Accountancy - I 2. Industrial Economics 3. Business Statistics 4. Operating System - I	1. Communication Skills	Elective Paper [Any One] 1. Office Automation Tools 2. Basic Web Technology - I
Total Credits 24	No. of Credits : 16	No. of Credits : 04	No. of Credits : 04

*[Handwritten signature]*

*Kwaghmare*

VC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

*[Handwritten signature]*  
Coordinator

Modern College of Computer Science & I.T.,  
Aurangabad.



### FIRST SEMISTER

Paper Number	Subject/ Title of the Paper	Course	Weekly		Credits		IA	UA	Total Marks	Duration of Theory Exam
			Th	Pr	Th	Pr				
I	Financial Accounting – I	Core Course	4	-	4	-	20	80	100	3 Hrs
II	Industrial Economics	Core Course	4	-	4	-	20	80	100	3 Hrs
III	Business Statistics	Core Course	4	-	4	-	20	80	100	3 Hrs
IV	Operating System – I	Core Course	2	4	2	2	20	80	100	3 Hrs
V	Business Communication	Ability Enhancement Compulsory	4	-	4	-	20	80	100	3 Hrs
VI	1.Office Automation Tools 2.Basic Web Technology –I	Discipline Specific Elective [Any One]	2	4	2	2	20	80	100	3 Hrs
	Total		20	8	20 + 4 = 24		120	480	600	--

  
**Co-ordinator**  
 Modern College of Computer Science & I.T.,  
 Aurangabad.

  
 Modern College of Computer Science & I.T.,  
 Aurangabad.



Paper I-

ACCOUNTANCY – I

Theory 80

Sessional 20

Credits 04

- 
1. Double Entry Accounting System Introduction and concept & Advantages, Accounting Cycle, Types of Account, Journalizing Rules, Subsidiary Books, Ledger, Trial Balance
  2. Cash Book – Single Column & Double Column.
  3. Trading ,Profit and Loss Account and Balance Sheet ( Simple exercise on Sole Trader, Final Account expected )
  4. Partnership Account: Introduction, Preparation of Partnership Final Accounts.
  5. Depreciation Introduction, meaning and definition, methods of Depreciation 1. Fixed Installment Method 2. Reducing Balance Method

**Reference Books:**

1. Shukla & Greval “ Advanced Accounts “ S. Chand & Co.
2. Batliboy “ Advanced Accounting “ , Standard Accounting Publication.
3. Khan & Jain “ Financial Management “ Tats Mc Graw Hill.
4. S.C Kuchal “ Financial Management “

Co-ordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.

W.C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



**PAPER II -**

**INDUSTRIAL ECONOMICS**

Theory 80

Sessional 20

Credits 04

- 
1. ~~Definition and scope of Business/Industrial Economics – Micro, Macro Economics~~  
Significance of Economics. Role in Business/Industrial decisions Economic Systems.
  2. Indifference Curve Analysis, Properties of Indifference Curves, Consumer equilibrium, Income effect, Price effect and Substitution effect.
  3. Production - Meaning - Laws of Returns.
  4. Economic Development:- Concept, of Economic Development, Indicators of Economic Development, Factors promoting Economic Development, Obstacles in the Economic Development of under developed countries, Features of under developed economy with reference to India.

**Reference Books:**

1. Business Economics by Prof. V.G. Mankar
2. Industrial Organisation and Engg. Economics by T.R. Banga, S.C. Sharma
3. Business and Managerial Economic by Sampat Mukherjee
4. Financial Institutions and Economic Growth in India. by Goyal, O.P.
5. Modern Economic Theory by K K Dewett

*Chibe*  
*(SAC)*  
Co-ordinator

Modern College of Computer Science & I.T.,  
Aurangabad.

*K. Waghmare*  
H.C. Principal  
Modern College of  
Computer Science & I.T.,  
Aurangabad.



PAPER III -

BUSINESS STATISTICS

Theory 80

Sessional 20

Credits 4

- ~~1. Introduction, Origin & Growth of Statistics, Definitions, Functions, Scopes and Limitations~~
- ~~2. Organising Statistical Survey, Planning the Survey, Scope of Survey Techniques of data Collection.~~
3. Sampling and sample designs.
4. Classification and Tabulation of Data.
5. Measures of Central Value - Mean, Median and Mode.
6. Measures of Dispersion - Range, Quartile Deviation, Mean Deviation, Standard Deviation.
7. Correlation Analysis: Introduction, Utility of the study of correlation, Correlation and Causation, Types of correlation - Positive and Negative Correlation Karl Pearson's Coefficient of Correlation.

**Reference Books:-**

1. Seymour Lipschutz Probability - Schaum Outline series. Mc Graw Hill.
2. M.C. Shukla and S.S. Gulshan - Statistic S. Chand & Co. New Delhi.
3. V. Seetharaman - A Text book of Statistics - M. Nandana South Bros.
4. Gupta and Kapoor Fundamental of Statistics.
5. D.N. Elhance Statistical Methods

*Ashe*  
(A.D.C.)  
Co-ordinator

*Kwaghmare*  
VC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



**PAPER IV –**

**OPERATING SYSTEM- I**

**Theory 80**

**Sessional 20**

**Credits 4**

---

1. Operating System concept, Its necessity, functions

---

2. Memory Management; Device Management; Job Scheduling, I/O Management, Resource Management, Types of Operating System.

3. DISK OPERATING SYSTEM ( DOS) System Prompt, Default Device, File Directory, Display of files, Directory handling, copying, deleting files,

4. Windows Exploring Windows, Settings, Control Panel, Add Remove Hardware, Printers, Date Time Regional Settings, Games, File Handling activities, Recycle Binetc.

5. Study of Internal & External Commands of MS-DOS DIR (With Options) DATE, TIME, CLS, COPY CON, EDIT, COPY, DELETE, REN, FORMAT, FIND, RESTORE, PROMPT, PATH, MORE, TYPE, VER, VOL, CHKDSK, DISKCOMP, TREE, SYS, MEM, XCOPY, Wild Card Characters, Configuring Dos and Batch Files, CONFIG.SYS, BREAK ON/OFF, BUFFER, FILES, SHELL, SET, ECHO, PAUSE, CALL, IF, GOTO, END.

**Reference Books:-**

- |                               |                    |
|-------------------------------|--------------------|
| 1. MS-DOS                     | By Peter Norton    |
| 2. Dos the Complete reference | By Jasma.          |
| 3. Mastering Windows . -      | Pc Software Taxali |

*Ashe*  
*CAAC*  
Co-ordinator

Modern College of Computer Science & I.T.,  
Aurangabad.

*Karshmare*  
VC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.





## PAPER V –

## COMMUNICATION SKILLS

Theory 80

Sessional 20

Credits 4

---

1. Meaning, Nature, Scope, Importance, Functions and Limitations of Communication.

---

2. Elements of Communications - Principles of Communication, Barriers to effective Communication.

3. Communication Skills:

a) Oral Communication:

Effective speaking - Principles of effective oral communication, speech preparation - guidelines for effective speech. listening skills - telephonic and group communication - Board and union Meetings - Interviews, their types, techniques and styles.

b) Written Communication:

Meaning and objective of written communication - Medias of written communication - Features of written communication - Preparation, analysis and interpretation of reports. Business letter writing - Application, references, Preparation of Tenders and Quotations - Drafting of sales circular letters.

4. Use of electric equipments in Business Communication - A hands on experiments on Telex, Fax, Pager, Cellular Phone, Computer and Internet.

**Reference Books:-**

1. Handbook Business Correspondence - Frailey
2. Technical & Professional Communication - Hickini.
3. Communication Dynamics Dr. Mrs. V.S. Mishra
4. Business Communication Richard Huseman.
5. Business Communication Bhende, Pradhan & Others.
6. Communication C. S. Rayndu
7. Business Communication Ray & Ray 8. Communication in I T Age Dhiraj Sharma

*Ashe*  
Co-ordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.

*Kwaghmare*  
IC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



---

---

**PAPER VI -****E1: OFFICE AUTOMATION TOLLS**

---

**Theory 80****Sessional 20****Credits 4**

**Familiarizing with different devices and facilities of computer system.**

**Study of MS-Word , Excel & Power Point:**

1. Features and tools of MS-Office, Word, Excel, Power Point.
2. **Word:** Creating word documents, menu, office assistant working with files , editing text, saving, printing , undo, redo, spelling, formatting, ruler, selecting, cutting, copying, numbering, bullets, page, orientation, margins, tables in a document, formatting text in table, addition deletion of rows columns, record handling, sorting, label, & envelop, using forms, Recycle bin. Protection of documents, mail merge.
3. **Excel:** Excel Sheet creation, entering data, layout and formatting of sheet preview & print, working with range, rows, columns, total, sorting using formatting toolbars, format cells, cell content moving & coping grouped & ungrouped worksheet alignment of text, border colors, page setup, chart, types of chart merging sizing printing chart objects, formatting charts, formula palette , functions & uses - Analysing data with excel.
4. **Power Point:** Creating a presentation, modifying visual elements, adding objects, applying transition, animation and linking, preparing layouts, presenting a slide show.

**Reference Books:-**

1. Courter Marquis - Office - 2000
2. Courter Marquis - Office - 97
3. Mansfield - MS- Office
4. Swell - MS- Office - 97
5. Syber Publication - Office- 2000 Complete Ulrich, L. - Sams Teach Your self 2000.

*Ashe*  
*(APC)*  
Co-ordinator  
Modern College of Computer Science & I.T.  
Aurangabad.

*K. Jayamase*  
TVC Printing  
Modern College of Computer Science & I.T.  
Aurangabad.

**PAPER VI****E1: BASIC OF WEB TECHNOLOGY**

Theory 80

Sessional 20

Credits 4

**Unit I HTML & Forms**

Introduction To HTML, WWW, W3C, web publishing, Common HTML, Tags Physical & Logical, Some basic tags like, changing background color of page, text color etc., Text formatting tags, ,tags, Ordered & Unordered Lists Tags, Inserting image, Links: text, image links, image mapping ,

**Unit II Table**

Tables , Frames, Form Introduction with text box, text area, buttons, List box, radio, checkbox, header & footer, Index form creating, mobile responsive, videos, songs.

**Unit III CSS**

Introduction To Style sheet, types of style sheets- Inline, External, Embedded CSS, text formatting properties, CSS Border, margin properties, Positioning Use of classes in CSS, color properties, use of <div>& <span>, padding, CSS multiple columns.

**Unit IV JavaScript Basic**

Introduction to Java Script, variable, commands, operations, syntax, objects, data types, JavaScript DOM theory.

**Reference Books:**

1. HTML, DHTML, JavaScript, Perl & CGI Ivan Bayross
2. HTML & CSS : The Complete reference, Fifth Edition By Thomas Powell
3. Html, Xhtml, And Css Bible (English) 5th Edition (paperback) by Schafer, Steven
4. HEAD FIRST HTML AND CSS, 2/ED (UPDATED FOR HTML) by ROBSON
5. Beginning HTML and CSS (English) (Paperback) by Rob Larsen
6. Learn to Code HTML and CSS (English) (Paperback) by Howe
7. Javascript Bible (English) 7th Edition by Danny Goodman Michael Morrison Paul Novitski Tia GustaffRayl
8. Javascript Programming: Pushing the Limits (English) 1st Edition By (2013)Jon Raasch
9. Head First JavaScript (2007) By michael Morrison

*Ashe*  
Coordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.

*Kwaghmare*  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



- 38 -

**D.R. BABASAHEB AMBEDKAR  
MARATHWADA UNIVERSITY,  
AURANGABAD.**



Curriculum of

BACHELOR OF COMPUTER APPLICATION

(BCA)

1ST YEAR

SECOND SEMESTER

under Choice Based Credit & Grading System

[ *Effective from the Academic Year 2018-19 & onwards* ]

VC Principal

Modern College of Computer Science & I.T.,  
Aurangabad.

Co-ordinator

Modern College of Computer Science & I.T.,  
Aurangabad.



Circular file

**DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY**



**CIRCULAR NO.SU/Commerce & Management/ II Sem./32/2018**

It is hereby inform to all concerned that, on the recommendation of the Dean, Faculty of Commerce & Management, the Hon'ble Vice-Chancellor in his emergency powers under Section-12(7) of the Maharashtra Public Universities Act, 2016 has accepted the syllabus of **B.Com., BBA & BCA II Sem.** on behalf of the Academic Council\_ to be applied from the Academic Year 2018-2019 and onwards.

All concerned are requested to note the contents of this circular and bring notice to the students, teachers and staff for their information and necessary action.

University Campus,  
Aurangabad-431 004.  
REF.NO. SU/ COMMERCE/2018-19.

20603 - 21053

Date:- 26-11-2018.

\*  
\*  
\*  
\*  
\*  
\*  
\*  
\*  
\*

*[Signature]*  
**Deputy Registrar,  
Syllabus Section.**

**Copy forwarded with compliments to :-**

- 1] **The Principals, affiliated concerned Colleges,  
Dr. Babasaheb Ambedkar Marathwada University.**
- 2] The Director, University Network & Information Centre, UNIC, with **a request to upload this Circular on University Website.**

**Copy to :-**

- 1] The Director, Board of Examination & Evaluation,
- 2] **The Section Officer, [ B.Com. Unit ] Examination Branch,**
- 3] The Section officer, [Eligibility Unit],
- 4] **The Programmer [Computer Unit-1] Examinations,**
- 5] **The Programmer [Computer Unit-2] Examinations,**
- 6] The In-charge, [E-Suvidha Kendra], Rajarshi Shahu Maharaj Pariksha Bhavan, Dr. Babasaheb Ambekar Marathwada University.
- 7] The Public Relation Officer,
- 8] The Record Keeper.

*[Signature]*  
**Co-ordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.**

*[Signature]*  
**I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.**




**FACULTY OF COMMERCE & MANAGEMENT .**

Structure - Bachelor of Computer Application (BCA)

Choice Based Credit System (CBCS) - 2018-19

Semester & Credits	Core Course [24]	Ability Enhancement Compulsory Courses [AEC] [6]	Discipline Specific Elective [DSE] [6]
I Credit 24	1. Financial Accounting – I 2. Industrial Economics 3. Operating System – I 4. Business Statistics	1. Business Communication	Elective Paper [Any I] 1. Office Automation Tools 2. Basic Web Technology - I
II Credit 24	1. Financial Accountancy – II 2. Programming in C 3. Operating System – II (LINUX) 4. Business Mathematics	1. Industrial Organisation	Elective Paper [Any One] 1. UNIX Operating System II 2. Basic Web Technology - II
III Credit 24	1. Principles of Management 2. OPSS using C++ 3. Business Law - I 4. DBMS	1. E-Business Essentials	Elective Paper [Any One] 1. Data Structure & Algorithm 2. RDBMS using ORACLE
IV Credit 24	1. Cost Accountancy 2. Java Programming 3. MIS & DSS 4. Business Law – II	1. Entrepreneurship Development	Elective Paper [Any One] 1. PC Maintenance 2. Advance Networking
V Credit 24	1. Management Accounting 2. SQL 2017 3. VB 4. Organisational Behaviour	1. Software Engineering	Elective Paper [Any One] 1. Banking & Insurance 2. Retail Management
VI Credit 24	1. Elements of Commercial Portals (HTML 5) 2. Android 9 3. Business Law III 4. Project	1. Software Testing	Elective Paper [Any One] 1. Services Marketing 2. Export Management
<b>Total Credits 144</b>	<b>No. of Credits : 96</b>	<b>No. of Credits : 24</b>	<b>No. of Credits : 24</b>

  
 Co-ordinator  
 Modern College of Computer Science & I.T.,  
 Aurangabad.

  
 I/C Principal  
 Modern College of Computer Science & I.T.,  
 Aurangabad.



**DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD.**

**FACULTY OF MANAGEMENT SCIENCE.**

Syllabus - Bachelor of Computer Application (BCA)

Choice Based Credit System (CBCS) - 2018-19

Semester & Credits	Core Course [04]	Ability Enhancement Compulsory Courses [AEC] [01]	Discipline Specific Elective [DSE] [01]
II Credit 24	1. Accountancy – II 2. Industrial Organisation 3. Mathematics 4. Programming in C	1. Principles of Management	Elective Paper [Any One] 1. Operating System – II (UNIX) 2. Basic Web Technology - II
<b>Total Credits 24</b>	<b>No. of Credits : 16</b>	<b>No. of Credits :04</b>	<b>No. of Credits : 04</b>

*[Handwritten signature]*

*[Handwritten signature]*  
 Co-ordinator  
 Modern College of Computer Science & I.T.,  
 Aurangabad.

*[Handwritten signature]*  
 VC Principal  
 Modern College of Computer Science & I.T.,  
 Aurangabad.



## SECOND SEMESTER

Paper Number	Subject/ Title of the Paper	Course	Weekly		Credits		IA	UA	Total Marks	Duration of Theory Exam
			Th	Pr	Th	Pr				
VII	Accountancy – II	Core Course	4	-	4	-	20	80	100	3 Hrs
VIII	Industrial Organisation	Core Course	4	-	4	-	20	80	100	3 Hrs
IX	Mathematics	Core Course	4	-	4	-	20	80	100	3 Hrs
X	Programming in C	Core Course	2	4	2	2	20	80	100	3 Hrs
XI	Principles of Management	Ability Enhancement Compulsory	4	-	4	-	20	80	100	3 Hrs
XII	1. Operating System- II (UNIX) 2. Basic Web Technology – II	Discipline Specific Elective [Any One]	2	4	2	2	20	80	100	3 Hrs
	<b>Total</b>		<b>20</b>	<b>8</b>	<b>20 + 4 = 24</b>		<b>120</b>	<b>480</b>	<b>600</b>	<b>--</b>

*Ashe*  
Co-ordinator

Modern College of Computer Science & I.T.,  
Aurangabad.

*Kwaghmare*  
VC Principal

Modern College of Computer Science & I.T.,  
Aurangabad.





PAPER VII –

ACCOUNTANCY – II

Theory 80  
Sessional 20  
Credits 4

1. Goodwill of Partnership Firm  
Meaning, Need, factors affecting Goodwill, Methods of valuing Goodwill, - Average Profit Method, Super Profit Method
2. Accounts of Non Trading Concern –  
Preparation of Receipts and Payment Accounts, Income and Expenditure Account and Balance Sheet
3. Company Final Accounts  
(Treatment of Provisions, Treatment of Dividends, Interim & Final Dividend on shares, Income Tax on Dividends, Payment of Dividends, Unclaimed Dividends, Treatment of Preliminary Expenses, Capital Profit, Income Tax Provision, Advance Payment, Payment of Tax, TDS, -- Simple exercises expected).
4. Single Entry System  
Concept- Ascertainment of Profit from records of single entry method

**Books:-**

1. Shukla & Greval "Advanced Accounts" S. Chand & Co.
2. Batliboy "Advance Accounting", Standard Accounting Publication.
3. Khan & Jain "Financial Management" Tata Mc Graw Hill.
4. S.C Kuchal "Financial Management"

**Practical's for Internal Assessment**

- 1.
- 2.
- 3.
- 4.
- 5 Any Other Suitable Practical.

PAPER VIII –

INDUSTRIAL ORGANISATION

Theory 80  
Sessional 20  
Credits 4

*Ashe (HOC)*  
**Co-ordinator**  
**Modern College of Computer Science & I.T.,**  
**Aurangabad.**

*Kwaghname*  
**VC Principal**  
**Modern College of Computer Science & I.T.,**  
**Aurangabad.**



1. Concept of Industrialization: What is Industrialization, its determinates Problems of Industrialization, Corporate Social Responsibility of Business (CSR)
2. Scale of Operation and Size of Business Units (with special reference to India). Economics of Scales. Meaning of large Medium and small size business- relative advantages and Disadvantages
3. Concept of concentration of power: combinations, Process of Integration vertical Horizontal Lateral and Diagonal and service integration types: Pools, Trusts Carte. Holding Companies, Syndicates Mergers and Amalgamation Multi- directorship Interlocking, Restructuring and Rationalisation.
4. Industrial Policy Resolutions of 1991 & WTO.
5. Corporate structure of business and essentials of Corporate Governance

**Books :**

1. Industrial Organisation & Engg. Economics by T.R. Banga, S.C. Sharma
2. Management & Organisation by C.B. Gupta
3. Industrial Administration & Management by Batty. J.
4. Control Practices in Indian Industries by Dave, Mahendra & Marthy, Guruprasad.
5. Principles of Industrial Organisation by Kimball, K.S. and Kimball D.S.

**Practical's for Internal Assessment**

- 1.
- 2.
- 3.
- 4.
- 5 Any Other Suitable Practical.

  
Co-ordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.

  
VC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



PAPER IX –

MATHEMATICS

Theory 80  
Sessional 20  
Credits 4

1. Logarithms, Rules for multiplication division and exponentiation
2. Permutations, Combinations, and Binomial Theorem.
3. Determinate - different methods of calculating determinants.
4. Matrix - representation - Addition, Subtraction, Multiplication and division.  
Inverse, Transpose, Adjoint - Cofactor - Singular Arrays - Vectors.

**Books:-**

- 1.
- 2.
- 3.

**Practical's for Internal Assessment**

- 1.
- 2.
- 3.
- 4.
- 5 Any Other Suitable Practical.

*Ashe*  
(ABC)  
Co-ordinator

Modern College of Computer Science & I.T.,  
Aurangabad.

*Kwaghmare*  
VIC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



<b>PAPER X -</b>	<b>PROGRAMMING IN C</b>	<b>Theory 80</b>
		<b>Sessional 20</b>
		<b>Credits 4</b>

1. Introduction and importance of C language
2. Constants, variables and data types:- Character set - tokens-constant-keywords and identifiers - variables- data types- declaration and assignment of variables- defining symbolic constants.
3. Operators and Expressions: Arithmetic, Relational and Logical Operators Assignment, increment and decrement of operators - conditional bitwise and special operators - arithmetic expression and its evaluation - hierarchy of arithmetic operations - evaluations, precedence and associativity - mathematical functions.
4. Decision-Making and branching: If statement Switch statement - GOTO statement - The ? : Operators.
5. Decision - Making and Looping: WHILE, DO, and FOR statements.
6. Arrays: One-dimensional - Two - dimensional and Multi-dimensional arrays.
7. Handling of Character Set: Declaration & Initialization of string variables - reading from and Writing to screen -Arithmetic operations - String handling functions
8. Structures and Unions: Definitions initialization and assigning values to member's arrays of Structures and arrays within structures structure with in structure- unions- size of structures.
9. Pointers: Declaration and initialization of pointers - pointer expression - pointer and arrays - pointer and character strings pointers and functions - pointers and structures, pointer on pointers.
10. File Maintenance in "C": Defining, Opening and closing a file - Input/output operations on a file- random access to file - command line arguments.
11. User Defined Functions: Form of "C" functions- calling a function - nesting of functions – recursion - functions with arrays.

**Books:**

1. Programming in "C" E Balgurusamy Tata Cm Graw-Hill
2. The "C" Programming Language :Brian W. Kenigham & Dennis Ritchie
3. The Spirit of "C"- Henry Mulish, Herbert L. Cooper.
4. Mastering "C" - Crain Bolon.

**Practical List for Programming in C Language**

- 1) Write a program to print a message "Welcome to C Language"
- 2) Write a program to print the personal information like Name, Class, College Name, Address, Age, Nationality, Contact No., etc.
- 3) Write a program to accept the personal information and print
- 4) write a program for addition, subtraction, multiplication and division of given number
- 5) Write a program to accept the marks of six subject the calculate the percentage
- 6) Write a program to print the table of given number
- 7) Write a program to find that entered number is even or odd
- 8) Write a program to print the even and odd number up to given number
- 9) Write a program to print the alphabets from a to z and z to a
- 10) Write a program to display the ASCII value of a to z alphabets
- 11) Write a program to find the prime number up to given number
- 12) Write a program to find that entered number is prime or not

*Asile*  
Coordinator



- 13) Write a program to print the Fibonacci series up to given number
- 14) Write a program to find the area of Perimeter of Triangle & Rectangle
- 15) Write a program to find the area of circle & square
- 16) Write a program to find the positive and negative number using if...else statement
- 17) Write a program to print the days of week & months of year using switch statement
- 18) Write a program to find the entered character is consonant or vowel using switch statement
- 19) Write a program to find the entered is leap or not a leap year using ternary operator
- 20) Write a program to print the class or division using else...if ladder
- 21) Write a program to find the greater number among two number using if else statement
- 22) Write a program using goto and break statement
- 23) Write a program to find the Armstrong Number
- 24) Write a program to print the number from 1 to 10 in ascending and descending order
- 25) Write a program to print the addition of 1 to 10 using array
- 26) Write a program to print the addition of given 10 numbers using array
- 27) Write a program to print the 2 X 2 matrix
- 28) Write a program to print the addition of 2 X 2 matrixes
- 29) Write a program to print the addition of 2 X 3 matrixes
- 30) Write a program to transpose of matrixes
- 31) Write a program to multiplication of matrixes
- 32) Write a program to find the Armstrong number
- 33) Write a program to find the factorial number of given number
- 34) Write a program to print the personal and professional information using structure and union
- 35) Write a program to sort the array using bubble sort technique
- 36) Demonstrate string library function
- 37) Demonstrate recursion function
- 38) Demonstrate pointers
- 39) Create a structure of employee & read record of five employees and display it.
- 40) Create a file student and store the record of ten students
- 41) Demonstrate file handling

*Asile*  
(HPC)  
Coordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.

Modern College of Computer Science & I.T.,  
Aurangabad.

*Kivaghmane*  
VC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



**PAPER XI -**

**PRINCIPLES OF MANAGEMENT**

**Theory 80**

**Sessional 20**

**Credits 4**

- I. Definition, Nature & Scope of Management, Importance, Management as an Art, Science and Profession, Different approaches to Management.
- II. Evolution of Management thought contribution of Taylor, Fayol, Follet, Drucker.
- III. Management Process, Planning, organizing, staffing, Direction, Controlling, coordination, leadership.
- IV. Functional Management, Human Resource Management, Marketing Management, Financial Management, Materials Management.

**Books:**

- 1) Organisation & Management by Agarwal R D
- 2) Management Practice by Varnashi Murthy
- 3) Principles of Management by Tripathi & Reddy

**Practical's for Internal Assessment**

- 1.
- 2
- 3
- 4
- 5 Any Other Suitable Practical.

*Asibe*  
*(AADC)*  
Co-ordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.

*Kwaghniere*  
VIC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



**PAPER – XII**

**E.1 - OPERATING SYSTEM II (UNIX)**

**Theory 80**  
**Sessional 20**  
**Credits 4**

1. The Operating System
2. Structure of Unix
3. Working with Unix
4. VI Editor
5. Shell Programming
6. Special Utilities
7. System Administration
8. Program Development Aids
9. Hello "C" Shell
10. Unix Internals Practicals on Unix. Familiarizing with Unix environment, Execution of different commands of Unix, Shell Programming, files in Unix-

**Books:**

1. Unix in Easy Steps by Mohammed Azam
2. Unix by Kernigham

**Practical List For UNIX Operating System**

- 1) FILE COMMANDS
- 2) DIRECTORY COMMANDS
- 3) SYMOLIC LINKS TERMINAL COMMANDS
- 4) HELP COMMANDS
- 5) INFORMATION COMMANDS
- 6) USEFUL CSHELL SYMBOLS
- 7) PERMISSIONS AND FILE STORAGE (UNIX)
- 8) PERMISSIONS AND FILE STORAGE (ANDREW)
- 9) PROCESSES PRINTING
- 10) ENVIRONMENT
- 11) CUSTOMIZING
- 12) NETWORKING
- 13) X-APPLICATIONS
- 14) UNIX FILTERS

  
**Co-ordinator**  
Modern College of Computer Science & I.T.,  
Aurangabad.

  
**VC Principal,**  
Modern College of Computer Science & I.T.,  
Aurangabad.



PAPER – XII

E.2 – Basics of Web Technology-II

Theory 80  
Sessional 20  
Credits 4

- Unit I : Event handling & Validations on Forms – JavaScript Handling Events on Button, Textbox, radio button, checkbox, drop down box, text area etc. Form Validation – numeric, alphanumeric, alphabets and any combination of these. Disabling the keys on the keyboard, regular expression
- Unit II: VBScript Introduction to VBScript, Variables, Data types, Control Structures & Loops, Functions in VBScript, Client side web scripting, validating forms, DOM, Handling errors
- Unit III: Web Publishing and Advanced HTML Concepts: Publishing the Site, The Realities of Publishing and Maintaining a Web Site, introduction of Search engine optimization, Meta –Information, Overview of Client/Server Programming on the Web.

Reference Books:

1. HTML, DHTML, JavaScript, Perl & CGI Ivan Bayross
2. HTML & CSS : The Complete reference, Fifth Edition By Thomas Powell
3. Hml, Xhtml, And Css Bible (English) 5th Edition (paperback) by Schafer, Steven
4. HEAD FIRST HTML AND CSS, 2/ED (UPDATED FOR HTML) by ROBSON
5. Beginning HTML and CSS (English) (Paperback) by Rob Larsen
6. Learn to Code HTML and CSS (English) (Paperback) by Howe
7. Javascript Bible (English) 7th Edition by Danny Goodman Michael Morrison Paul Novitski Tia GustaffRayl
8. Javascript Programming: Pushing the Limits (English) 1st Edition By (2013)Jon Raasch
9. Head First JavaScript (2007) By michael Morrison

Practical List for Basic Web Technology - II

- 1) Introducing Web Browser and concept of URL and Website
- 2) Write a program to structure of HTML
- 3) Write a program on formatting tags
- 4) Write a program on PRE, DIV, SPAN tags
- 5) Write a program on PRE, DIV, SPAN tags
- 6) Write a program on font, address, marquee tags
- 7) Write a program to text level elements
- 8) Write a program on mailto anchor
- 9) Write a program on img tag with all attributes
- 10) Write a program on table tag with all attributes
- 11) Write a program on frame tag with all attributes
- 12) Write a program on user registration form using all controls and attributes of form tag
- 13) Write a program on rollover button
- 14) Write a program on rollover button
- 15) Write a program on css of embedded styles, inline styles, imported/external styles
- 16) Write a program on adding java script to documents with example
- 17) Write a program on input and output statements of java script

*Ashe*  
(A.S.C.)  
Co-ordinator

*Kwaghmane*





- 43 -

**D.R. BABASAHEB AMBEDKAR  
MARATHWADA UNIVERSITY,  
AURANGABAD.**



**Curriculum of  
BACHELOR OF COMPUTER APPLICATION  
(BCA)  
IIND YEAR  
THIRD SEMESTER  
under Choice Based Credit & Grading System**

*[ Effective from the Academic Year 2019-20 & onwards ]*

*[Handwritten signatures and dates: 17/6/19, 17/6/19, 17/6/19]*

*[Handwritten signature]*  
Co-ordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.

*[Handwritten signature]*  
IC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

Circular file

- 39 -

**DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY****CIRCULAR NO.SU/Commerce & Management/ III Sem./50/2019**

It is hereby inform to all concerned that, on the recommendation of the Dean, Faculty of Commerce & Management, the Hon'ble Vice-Chancellor in his emergency powers under Section-12(7) of the Maharashtra Public Universities Act, 2016 has accepted the syllabi of **B.Com., BBA & BCA III Sem.** under Choice Based Credit and Grading System on behalf of the Academic Council to be applied from the Academic Year 2019-2020 and onwards. The said syllabi are uploaded on bamu.ac.in at University website.

All concerned are requested to note the contents of this circular and bring notice to the students, teachers and staff for their information and necessary action.

University Campus,  
Aurangabad-431 004.  
REF.NO. SU/ COMMERCE/2018-19  
25445-844  
Date:- 31-05-2019.

\*  
\*  
\*  
\*  
\*  
\*  
\*  
\*  
\*  
\*

*[Signature]*  
**Deputy Registrar,  
Syllabus Section.**

**Copy forwarded with compliments to :-**

- 1] **The Principals, affiliated concerned Colleges, Dr. Babasaheb Ambedkar Marathwada University.**
- 2] **The Director, University Network & Information Centre, UNIC, with a request to upload this Circular along with the said syllabi on University Website.**

**Copy to :-**

- 1] The Director, Board of Examination & Evaluation,
- 2] **The Section Officer, [ B.Com. Unit ] Examination Branch,**
- 3] **The Programmer [Computer Unit-1] Examinations,**
- 4] **The Programmer [Computer Unit-2] Examinations,**
- 5] The In-charge, [E-Suvidha Kendra], Rajarshi Shahu Maharaj Pariksha Bhavan, Dr. Babasaheb Ambedkar Marathwada University.
- 6] The Public Relation Officer,
- 7] The Record Keeper.

*[Signature]*  
**Co-ordinator**  
Modern College of Computer Science & I.T.,  
Aurangabad.

*[Signature]*  
**I/C Principal**  
Modern College of Computer Science & I.T.,  
Aurangabad.



**DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD.**

**FACULTY OF COMMERCE & MANAGEMENT.**

Syllabus - Bachelor of Computer Application (BCA)

Choice Based Credit System (CBCS) - 2019-20

Semester & Credits	Core Course [04]	Ability Enhancement Compulsory Courses [AEC] [01]	Discipline Specific Elective [DSE] [01]
III Credit 24	1. Principle of Management 2. OPSS using C++ 3. Business Law - I 4. DBMS	1. E-Business Essential	Elective Paper [Any One] 1. Data Structure & Algorithm 2. RDBMS using ORACLE
Total Credits 24	No. of Credits : 16	No. of Credits : 04	No. of Credits : 04


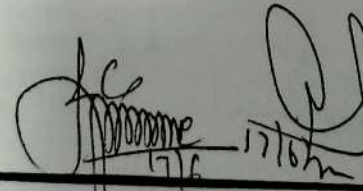
*[Handwritten signatures and dates]*  
17/6/19      17/6      17/6/2019

*Asibe*  
Co-ordinator  
CBCS  
Modern College of Computer Science & I.T.,  
Aurangabad.

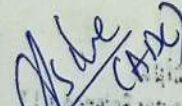
*Karaghmare*  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

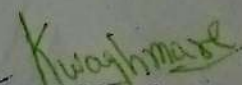
**Structure of B. C. A. Third Semester**  
**Choice Based Credit Grading System (CBCS) 2019 - 2020**

Paper Number	Subject/ Title of the Paper	Course	Weekly		Credits		IA	UA	Total Marks	Duration of Theory Exam
			Th	Pr	Th	Pr				
XIII	Principles of Management	Core Course	4	-	4	-	20	80	100	3 Hrs
XIV	OPPS using C++	Core Course	2	2	2	2	50	50	100	2 Hrs
XV	Business Law - I	Core Course	4	-	4	-	20	80	100	3 Hrs
XVI	DBMS	Core Course	4	-	4	-	20	80	100	3 Hrs
XVII	E-Business Essential	Ability Enhancement Compulsory	4	-	4	-	20	80	100	3 Hrs
XVIII	1.Data Structure and Algorithm 2.RDBMS using ORACLE	Discipline Specific Elective [Any One]	2	2	2	2	50	50	100	2 Hrs
	<b>Total</b>		20	4	20 + 4 =24		120	480	600	--

 17/6/19
  17/6/19

2

  
 Co-ordinator  
 Modern College of Computer Science & I.T.,  
 Aurangabad.

  
 VC Principal  
 Modern College of Computer Science & I.T.,  
 Aurangabad.



B.C.A. III<sup>rd</sup> Semester Syllabus (CBCS)  
Paper No. XIII – Principles of Management

Theory – 80 Marks  
Sessional – 20 Marks

	No. of Lectures
Unit - I <b>Introduction of Management</b> : Introduction, Meaning and concept of management, nature, scope, characteristics and importance of management, role and functions of management, level of management, difference between management and administration, brief review of management thoughts of F. W. Taylor, Henry Fayol, Elton Mayo, Peter Drucker etc.	( 12 )
Unit – II <b>Managerial Planning and Decision Making</b> : <b>Planning</b> : meaning and definition, characteristics and importance of planning, planning process, benefits of ideal planning, limitations of planning, types of plans. <b>Forecasting</b> : meaning and definition, methods of forecasting. <b>Decision making</b> : meaning and definition, types of decisions, decision making process	( 12 )
Unit - III <b>Staffing and Organization</b> : <b>Staffing</b> : meaning and definition of staffing, need and importance of staffing, Recruitment: meaning, definition, process, and methods of recruitment, Selection: meaning, definition, selection procedure and training of personnel <b>Organization</b> : meaning, definition and importance of organization, principles of organization, types of organization, difference between accountability and responsibility, centralization of Authority and decentralization of Authority.	( 12 )
Unit - IV <b>Directing and Controlling</b> : <b>Directing</b> : meaning, definition and importance of directing, principles and techniques of directing <b>Controlling</b> : meaning, definition, need and importance of control, process of control, techniques of control	( 12 )
Unit - V <b>Recent Trends in Business Management</b> : Change management, disaster management, TQM, Bench Marking, Six Sigma, <b>Management development</b> : meaning, definition, need and importance, management development process, methods and techniques <b>Practical: 20 Marks (to be conducted by the department in each college as per convenience)</b> 1. Test- 05 2. Tutorial- 10 3. Seminar- 05	( 12 )

**Reference Books :**

1. Principles of management by Dr. K.Natarajan and Dr.K.PGanesan
2. Principles of management by P.Subbarao
3. Principles of management by B.P.Singh / Dr.TRamawamy
4. Principles & Practice - T N Chhabra, Dhanapat Rai &Co.of Management.
5. Management – LM .Prasad.
6. Makers of Modern India - NBT Publication.
7. Principles and practice of management by Saxsena S. C.

---XXY---



**B.C.A. III<sup>rd</sup> Semester Syllabus (CBCS)  
Paper No. XIV – OPPS using C++**

**Theory – 50 Marks  
Sessional – 50 Marks**

	No. of Lectures ( 10 )
<b>Unit - I</b> <b>Introduction to C++ :</b> Basic concepts, object oriented programming Class, Object, Data Abstraction, benefits & applications of OOP, Structure of C++ program, Creating a source file, compiling and Linking, Tokens, Expressions and Control structures: Introduction, Tokens, keywords, Identifiers and constants, Data types - Basic, User defined and Derived, Symbolic constant, Type Compatibility, Variables - Declaration and Dynamic initialization, Reference variable, Operators in C++, Scope resolution operator, Member Referencing operators, Memory management operators, Manipulators, Type cast operators, Expression and their types, Special Assignment Expressions, Implicit conversions, Operator overloading introduction, Operator precedence, Control structures – if-else, do-while, for , switch	
<b>Unit – II</b> <b>Functions in C++ :</b> Introduction, The main function, Function prototyping, Call by reference, Return by reference, Inline function – Making an outside function Inline, Arguments - default, constant, Math library functions.	( 08 )
<b>Unit – III</b> <b>Classes and Objects :</b> Introduction, Creating a class and objects, Defining member functions inside and outside class, Nesting of member functions, Private member functions, Arrays within a class, Memory allocation of objects, Static data members and static member functions, Array of objects, Objects as function arguments, Friend functions. Returning objects. Constructors, Types of constructor, Destructors.	( 14 )
<b>Unit – IV</b> <b>Inheritance :</b> Introduction, Base class and derived class examples, Types of Inheritance, Virtual base class, Abstract class, Constructors in derived class.	( 14 )
<b>Unit – V</b> <b>Polymorphism :</b> Compile Time Polymorphism, Function overloading, Operator Overloading Introduction, Overloading unary and binary operator, Overloading using friend function, Overloading insertion and extraction operators, String manipulation using operator overloading, Runtime Polymorphism, pointers to objects, pointer to derived, classes, Virtual functions and pure virtual functions.	( 14 )

**Practical's U/A : 50 Marks**

- 1. One Test : 10 Marks
- 2. Oral : 20 Marks
- 3. Writing of Algorithms in Journal / File : 20 Marks

**Co-ordinator**  
**Modern College of Computer Science & I.T.,**  
**Aurangabad.**



**Reference Books :**

1. Object oriented programming with C++ - by E Balagurusamy, Tata McGraw-Hill Publishing.
2. Object Oriented Programming with C++ by Robert Lafore, Galgotia
3. Let us C++ Yeshwant Kanetkar, BpB Publications

**Practical list for programming in C++**

1. Simple C++ Program.
2. Program on Data Types and Operators.
3. Program for Looping and Branching Statement.
4. Program for Reference Variable.
5. Program for Function Overloading.
6. Program for Friend Function and Inline Function.
7. Program for Static Data Member and Function.
8. Program for Operator Overloading.
9. Program for Inheritance.
10. Program for Virtual Function and Classes.

--- x x x ---

*[Handwritten signatures and dates]*  
17/6/19      17/6/19      17/6/19



**B.C.A. III<sup>rd</sup> Semester Syllabus (CBCS)  
Paper No. XV – Business Laws – I**

**Theory – 80 Marks  
Sessional – 20 Marks**

	<b>Periods</b>
<b>Unit - I</b> <b>Indian Contract Act 1872</b> : Meaning and Definition of Agreement and Contract, Features of Contract Act, Types of Contract, Essentials of valid contract, Offer and Acceptance, Breach of Contract	<b>( 12 )</b>
<b>Unit - II</b> <b>Sell of Goods Act 1930</b> : Meaning and Important Definition – Sell of Goods Act, Agreement to sell vs. Contract of sell, Essentials of valid contract of sell, Condition and Warranty, Sell by Auction and Hire Purchase Agreement, Buyers and Sellers Rights and Duties.	<b>( 12 )</b>
<b>Unit - III</b> <b>Negotiable Instrument Act 1881</b> : Concept and Important definition of Act, Promissory Note and Cheque, Characteristics of the Act, Dishonor of Negotiable Instrument, Discharge of Negotiable Instrument, Bills of Exchange.	<b>( 12 )</b>
<b>Unit - IV</b> <b>Consumer Protection Act (Amended Act 2002)</b> : Meaning and Important Definition Of Act, Significance of Consumer Protection, Objectives of the Act, Working of Consumer Protection Council, Composition of consumer disputes redressal agencies.	<b>( 12 )</b>
<b>Unit - V</b> <b>Cyber and IT Act 2000</b> : Important Definition - IT Act 2000, Cyber Fraud and Cyber Cheating, Copy right – Meaning and Definition, License of the Copy Right, Digital Signature, Digital Signature. Certificate.	<b>( 12 )</b>

**Sessional Works : 20 Marks**

- College can take decisions accordingly.

**Reference Books:**

1. Business Law – Dr. Nowlakha
2. Mercantile Law – N D Kapoor
3. Indian Contract Act – Dr. Avtarsingh
4. Mercantile and Industrial Law – M.C Shulka
5. Business Law – Maheshwar
6. Company and Business Law – Shukla and Gerwal
7. Commercial and Industrial Law – Kuchal
8. Cyber Law Simplified – Tata McGrawhill VivekSood
9. Indian Cyber Law – Suresh T Vishwanathan

17/6/19      17/6/19      17/6/19

S. S. Be  
 Co-ordinator  
 Modern College of Computer Science & I.T.,  
 Aurangabad.

I/C Principal  
 Modern College of Comput...  
 Aurangabad.





B.C.A. III<sup>rd</sup> Semester Syllabus (CBCS)  
Paper No. XVI – DBMS

Theory – 80 Marks  
Sessional – 20 Marks

	Periods
<b>Unit - I Introduction (Theory) :</b> Data, Tables, DBMS, Characteristics of DBMS, need of DBMS, attributes, entity, E-R Diagrams, relationships, ODBMS, Two tier and three tier architecture,	( 10 )
<b>Unit - II Transactions (Theory) :</b> Concept of transaction, ACID properties, Transaction and system concepts, States of transaction, Serializability, backup and recovery.	( 08 )
<b>Unit - III Concurrency (Theory) :</b> Concurrent transactions, Two -phase locking techniques, Concurrency control, Locking techniques, E-R Diagram, Deadlock	( 14 )
<b>Unit - IV Normalization (Theory) :</b> E.F. Codd rules, Normal forms based on primary keys(1 NF, 2 NF, 3 NF, BCNF)	( 14 )
<b>Unit - V MS-Access (Theory/ Practical) :</b> Primary Key, Foreign Key, Creating tables in MS-Access, creating primary key, foreign key and create queries to fetch data.	( 14 )

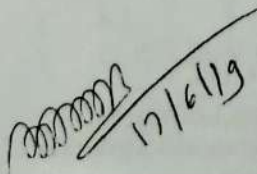
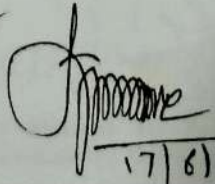

Sessional Works : 20 Marks

- College can take decisions accordingly.

Reference Books :

1. Elmasri&Navathe, Fundamentals of Database systems, Addison &Weisely, New Delhi.
2. H. F. Korth& A. Silverschatz, Database Concepts, Tata McGraw Hill, New Delhi
3. C. J. Date, Database Systems, Prentice Hall of India, New Delhi.
4. Ivan Bayross, SQL,PL/SQL, The programming language of Oracle

----- xxx -----

 17/6/19  
 17/6/19  
 17/6/19

  
 Co-ordinator  
 (ADC)

  
 VC Principal  
 Modern College of Computer  
 Aurangabad



**B.C.A. III<sup>rd</sup> Semester Syllabus (CBCS)  
Paper No. XVII – E-Business Essential**

**Theory – 80 Marks  
Sessional – 20 Marks**

	<b>Periods</b>
<b>Unit - I Introduction to e-business :</b> Origin, Concept, Nature ,Definition, Features, Merits, Demerits.	<b>( 10 )</b>
<b>Unit – II E-business Environment:</b> Information society, building process for communities, multi – option society, ethics in electronic business.	<b>( 08 )</b>
<b>Unit - III E-business &amp; ICT :</b> Meaning, history, importance of internet, internet v/s online service, basic, knowledge of computer network, world wide web, web page, website.	<b>( 14 )</b>
<b>Unit - IV E-Business Models &amp; Supply Chain Management :</b> Classification of E business models, definition of supply chain management elements of SC, key issues in SCM.	<b>( 14 )</b>
<b>Unit - V E-Payments :</b> E-Money and E-payments, different forms of E-payment, E-banking RTGS, NEFT, EFT, Internet Banking, Mobile Banking, GOOGLE PAY, PAYTM etc.	<b>( 14 )</b>
<b>SESSIONAL WORK: 20 Marks</b>	
1) One test 05 marks	
2) One tutorial 05 marks	
3) Online dummy transactions and list of E-commerce websites 10 Marks	
<b>Reference Books :</b>	
1) Rayudu cs. E-commerce E-business	
2) Ravi Kalakos& Marcia Robinson E-business	
3) Rich , jason R starting an e-commerce business	
4) Kamlesh Bajaj DebjaniNag , E-Commerce: The cutting Edge of Business Tata McGraw Hill Publication,new Delhi.	
5) N.S.Toor ,handbook of Banking Information,28 <sup>th</sup> Edition,Skylark Publication New Delhi.	

----- xxx -----

*(Handwritten signatures and dates)*  
17/6/19

**B.C.A. III<sup>rd</sup> Semester Syllabus (CBCS)  
Paper No. XVIII – Data Structure and Algorithm**

*(Handwritten signature)*  
**Co-ordinator**  
**Modern College of Computer Science & I.T.,**  
**Aurangabad.**

*(Handwritten signature)*  
**I/C Principal**  
**Modern College of Computer Science & I.T.,**  
**Aurangabad.**



Theory - 50 Marks  
Practical's U/A - 50 Marks

	Periods
<b>Unit - I Introduction to Data Structure :</b> Introduction to Data Structure : Types , Primitive , Secondary , Simple Compound , Linear and Non Linear Data Structure	( 10 )
<b>Unit - II Linear Data Structure :</b> Linear Data Structure : Array , Linked List , Queue, Stacks, Operations on linear Data Structure, Memory Representation of Linear Data Structure	( 08 )
<b>Unit - III Non Linear Data Structure :</b> Non Linear Data Structure : Tree , Graphs, Binary Tree Structures , Networks, Operations on Non Linear Data Structure, Implementation of Data Structure in computer memory	( 14 )
<b>Unit - IV Algorithms :</b> Algorithm Concept, Features & Characteristics, Designing of Algorithm for Insertion & Deletion of Records in Array, Linked List, Stack, Queue , Traversal of Linked List, Stack, Queue , Binary Tree	( 14 )
<b>Unit - V Graph Theory and Sorting :</b> Graph Theory : Terminology, Sequential Representation of Graph, Adjacency Matrix , Linked List Representation of Graph, Operations on Graph , Traversing Graph, Bubble Sort , Selection Sort, Merge Sort and Insertion Sort	( 14 )

**Practical's U/A : 50 Marks**

- 4. One Test : 10 Marks
- 5. Oral : 20 Marks
- 6. Writing of Algorithms in Journal / File : 20 Marks

**References Books :**

- 1. Tannenbum : Data Structure
- 2. Seymour LipSchutz : Data Structure
- 3. Aho : Data Structure and Algorithm
- 4. Bhagat Singh & Nap : Data & File Structure.
- 5. Droomy : How to solve it by Computer.

----- xxx -----

*[Signature]*  
12/6/19

*[Signature]*  
12/6/19

B.C.A. III<sup>rd</sup> Semester Syllabus (CBCS)  
Paper No. XVIII - RDBMS using ORACLE

*[Signature]*  
Co-ordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.

*[Signature]*  
VC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



Master file



Master II

Theory - 50 Marks  
Practical's U/A - 50 Marks

		Periods
<b>Unit - I</b>	RDBMS Definition, Characteristics of RDBMS, Application and advantages of RDBMS, Instances, Schemas and Database States, Three Levels of Architecture, Data Independence, DBMS languages, Data Dictionary, Database Users, Data Administrators. <b>(Theory)</b>	(10)
<b>Unit - II</b>	Data Models, types and their comparison, Entity Relationship Model, Entity Types, Entity Sets, Attributes and its types, Keys, E-R Diagram, Data Integrity, Referential Integrity constraints, Domain Integrity Constraints <b>(Theory)</b>	(08)
<b>Unit - III</b>	Relational Algebra (selection, projection, union, intersection, Cartesian product, Different types of join like theta join, equi-join, natural join, outer join), Relational Calculus, Functional Dependencies, Good & Bad Decomposition, Anomalies as a database: A consequences of bad design <b>(Theory)</b>	(14)
<b>Unit - IV</b>	Introduction to SQL, DDL, DML, and DCL statements, Creating Tables, Adding Constraints, Altering Tables, Update, Insert, Delete & various Form of SELECT-Simple, Using Special Operators for Data Access. Aggregate functions, Joining Multiple Tables (Equi Joins), Joining a Table to itself (self Joins) Functions. <b>(Theory/ Practical)</b>	(14)
<b>Unit - V</b>	Introduction to PL/SQL (blocks of PL/SQL, Variables, constants), Control Structure Introduction to Stored Procedures, Functions, Cursor and Triggers <b>(Theory/ Practical)</b>	(14)

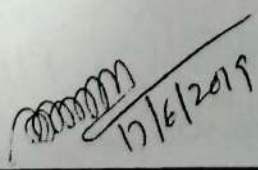
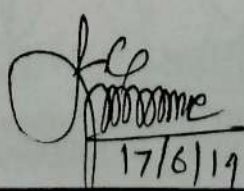

**Practical's U/A : 50 Marks**

- 1. One Test : 10 Marks
- 2. Oral : 20 Marks
- 3. Writing of Algorithms in Journal / File : 20 Marks

**Reference Books :**

1. Elmasri & Navathe, Fundamentals of Database systems, Addison & Weisely, New Delhi.
2. H. F. Korth & A. Silverschatz, Database Concepts, Tata McGraw Hill, New Delhi
3. C. J. Date, Database Systems, Prentice Hall of India, New Delhi.
4. Ivan Bayross, SQL, PL/SQL, The programming language of Oracle

----- XXX -----

  
 Co-ordinator (ADC)  
 Modern College of Computer Science & I.T.,  
 Aurangabad

  
 IIC Principal  
 Modern College of Computer Science & I.T.,  
 Aurangabad



**D.R. BABASAHEB AMBEDKAR  
MARATHWADA UNIVERSITY,  
AURANGABAD.**



Curriculum of  
BACHELOR OF COMPUTER APPLICATION  
(BCA)  
IIND YEAR  
FOURTH SEMESTER  
under Choice Based Credit & Grading System

*[ Effective from the Academic Year 2019-20 & onwards ]*

*(Signature)*  
Coordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.

*(Signature)*  
BC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



Circular file

**DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY**



**CIRCULAR NO.SU/Commerce & Management/ IV Sem./21/2019**

It is hereby inform to all concerned that, on the recommendation of the Dean, Faculty of Commerce & Management, the Hon'ble Vice-Chancellor in his emergency powers under section-12(7) of the Maharashtra Public Universities Act, 2016 has accepted the syllabi of **B.Com., BBA & BCA IV Sem.** under Choice Based Credit and Grading System on behalf of the Academic Council to be applied from the Academic Year 2019-2020 and onwards. The said syllabi are also available on [bamu.ac.in](http://bamu.ac.in) on University website.

All concerned are requested to note the contents of this circular and bring notice to the students, teachers and staff for their information and necessary action.

University Campus,  
Aurangabad-431 004.

REF.NO. SU/ COMMERCE/2019-20

4388-4338

Date:- 15-11-2019.

\*  
\*  
\*  
\*  
\*  
\*  
\*  
\*  
\*  
\*

*[Signature]*  
**Deputy Registrar,  
Syllabus Section.**

**Copy forwarded with compliments to :-**

- 1] **The Principals, affiliated concerned Colleges, Dr. Babasaheb Ambedkar Marathwada University.**
- 2] **The Director, University Network & Information Centre, UNIC, with a request to upload this Circular along with the said syllabi on University Website.**

**Copy to :-**

- 1] The Director, Board of Examination & Evaluation,
- 2] **The Section Officer, [ B.Com. Unit ] Examination Branch,**
- 3] **The Programmer [Computer Unit-1] Examinations,**
- 4] **The Programmer [Computer Unit-2] Examinations,**
- 5] The In-charge, [E-Suvidha Kendra], Rajarshi Shahu Maharaj Pariksha Bhavan, Dr. Babasaheb Ambedkar Marathwada University.
- 6] The Public Relation Officer,
- 7] The Record Keeper.

*[Signature]*  
**Co-ordinator**

**Modern College of Computer Science & I.T.,  
Aurangabad.**

*[Signature]*  
**UIC Principal,  
Modern College of Computer Science & I.T.,  
Aurangabad.**



**DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD.**

**FACULTY OF COMMERCE & MANAGEMENT.**

Syllabus - Bachelor of Computer Application (BCA)

Choice Based Credit System (CBCS) - 2019-20

Semester & Credits	Core Course [04]	Ability Enhancement Compulsory Courses [AEC] [01]	Discipline Specific Elective [DSE] [01]
IV Credit 24	1. Cost Accountancy 2. Java Programming 3. MIS & DSS 4. Business Law – II	1. Entrepreneurship Development	Elective Paper [Any One] 1. PC Maintenance <b>OR</b> 2. Advance Networking
Total Credits 24	No. of Credits : 16	No. of Credits :04	No. of Credits : 04

Dean  
BOS  
Chairman

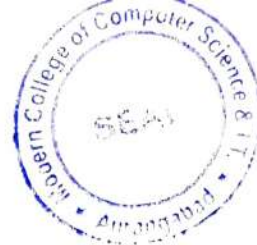
BOS  
Chairman

BOS  
Chairman

BOS  
Chairman

Co-ordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.

HC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



### Structure of B. C. A. Fourth Semester (CBCS) 2019 - 20

Paper Number	Subject/ Title of the Paper	Course	Weekly		Credits		IA	UA	Total Marks	Duration of Theory Exam
			Th	Pr	Th	Pr				
XIX	Cost Accountancy	Core Course	4	-	4	-	20	80	100	3 Hrs
XX	Java Programming	Core Course (Theory)	3	-	2	-	-	50	50	2 Hrs
		Practical	-	1	-	2	-	50	50	2 Hrs
XXI	MIS & DSS	Core Course	4	-	4	-	20	80	100	3 Hrs
XXII	Business Law – II	Core Course	4	-	4	-	20	80	100	3 Hrs
XXIII	Entrepreneurship Development	Ability Enhancement Compulsory	4	-	4	-	20	80	100	3 Hrs
XXIV	1.PC Maintenance OR 2.Advanced Networking	Discipline Specific Elective [Any One] (Theory)	3	-	2	-	-	50	50	2 Hrs
		Practical	-	1	-	2	-	50	50	2 Hrs
<b>Total</b>			<b>22</b>	<b>02</b>	<b>20 + 4 = 24</b>		<b>80</b>	<b>520</b>	<b>600</b>	<b>--</b>

\*Note:- As per UGC norms one theory lecture is equal to two practicals.

*Asibe*  
Coordinator  
Modern College of Computer Science & I.T.,  
Aurangabad

*Koachmane*  
VC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.





**B.C.A. IV<sup>th</sup> Semester Syllabus (CBCS)**  
**Paper No. XIX – Cost Accountancy**

**Theory – 80 Marks**  
**Sessional – 20 Marks**

	Lectures
<b>Unit - I</b> <b>Cost Accounting</b> : Definition, Nature, & Scope of Cost Accounting, Distinction between Cost, Financial and Management Accounting, Classification & Elements of Cost, Material, Labour, Expenses, Direct & Indirect Cost, Overheads.	( 10 )
<b>Unit – II</b> <b>Costs</b> : Prime Cost, Factory / Works Cost, Administrative Cost, Total Cost, Cost of Sales	( 08 )
<b>Unit - III</b> <b>Preparation of Cost Sheet :</b>	( 14 )
<b>Unit - IV</b> <b>Material</b> : Purchasing, Purchase Requisition, EOQ, Purchase Procedure, Receiving & Recording of Material, Documents, Goods Received Note, Bin Card, Issue of Materials, Pricing Method, LIFO, FIFO, Average Method.	( 14 )
<b>Unit - V</b> <b>Wages</b> : Compensation, Methods of wage payment, Fixed Rate, Piece Rate, Contract, Bonus, Halsay & Rowan Plan.	( 14 )

**Practical: 20 Marks (to be conducted by the department in each college as per convenience)**

1. Test- 05
2. Tutorial- 10
3. Seminar- 05

**Reference Books :**

1. Practical Costing : Khanna, Pande and Ahuja
2. Cost Accounting : Bhatia HSM
3. Principles & Practices of Cost Accounting : N. K. Praasad
4. Cost Accounting ( Methods & Problems ) : B. K. Bhar
5. Fundamental of Costing: S. N. Maheshwari.

----- XXX -----



**B.C.A. IV<sup>th</sup> Semester Syllabus (CBCS)**  
**Paper No. XX – Java Programming**

**Theory – 50 Marks**  
**Sessional – 50 Marks**

**Lectures**

**( 15 )**

**Unit - I**     **Overview of Java Language :** Java History, Java Features, How Java Differ from C and C++, JVM, Java Environment, Java Programming Structure, Types of Comment, Java Tokens: Reserve Keywords, Identifiers, Literals, Operators, Separators, Variables, Constant, Data Types, Array, Type Casting, Control Statement : Branching statement, Looping statement

**( 15 )**

**Unit – II**     **Classes, Objects and Methods :** Introduction, Defining Class : Fields Declaration, Methods Declaration, Creating Objects, Visibility Control, Use of 'this' Keyword, Method Parameters, Method Overloading, Static Members, Final Method, Inheritance and It's Types, Method Overriding, Final Variable, Method and Final Class,

**Interface, Package and Exception Handling :** Defining and implementing interface, Inner Classes, Package: Create Package, Accessing Package, Exception, Types of Error, Multiple catch statement, Creating User defined Exception, Finally clause

**Unit – III**     **String and Stream :** String Classes, String Buffer Class, Stream Classes: Types of Streams, Byte Stream Classes, Character Stream Classes **Applets :** Introduction to Applet , Types of Applet, Applet vs Application , Applet class, advantages of Applet , Applet Lifecycle, My First Applet, Applet tag, Passing Parameters to Applet .

**( 15 )**

**Graphics:** Basic Shapes: drawLine, drawArc, fillArc, drawPolygon, fillPolygon, Color & Color Methods, Fonts.

**Practical List:**

**( 15 )**

- 1) Program to demonstrate Constant Variable.
- 2) Program to demonstrate scope of Variable
- 3) Program to demonstrate branching statement
- 4) Program to demonstrate Looping statement
- 5) Program to demonstrate simple class
- 6) Program to demonstrate method parameter
- 7) Program to demonstrate method overloading
- 8) Program to demonstrate constructor
- 9) Program to demonstrate static member
- 10) Program to demonstrate Method overriding
- 11) Program to demonstrate Final variable, Method and Final Class.
- 12) Program to demonstrate Finilize method()
- 13) Program to demonstrate Array and It's types.
- 14) Program to demonstrate String class and it's method.
- 15) Program to demonstrate String Buffer and it's method.



- 16) Program to demonstrate inheritance and its Types
- 17) Program to demonstrate Abstract method and Abstract Class.
- 18) Program to demonstrate Multiple catch statement
- 19) Program to demonstrate finally clause
- 20) Program to demonstrate package
- 21) Program to demonstrate interface
- 22) Program to demonstrate Applet life cycle
- 23) Program to demonstrate param tag
- 24) Program to demonstrate Graphics class

**Practical's U/A : 50 Marks**

- 1. One Test : 10 Marks
- 2. Oral : 20 Marks
- 3. Writing of Algorithms in Journal / File : 20 Marks

**Reference Books :**

- 1. Complete Reference Herbert Schildt Tata McGraw- Hill Publishing company Ltd.
- 2. Java 2 programming black books Steven Holzner DreamTech Press
- 3. Core Java Volume-I Fundamentals Eighth Edition Cay S. Horstmann, Gary Cornell, Prentice Hall Sun Microsystems Press
- 4. Programming with Java E Balagurusamy The McGraw Hill Education Pvt. Ltd. New Delhi

----- XXX -----

*Ashe*  
Coordinator  
(ADC)

Modern College of Computer Science & I.T.,  
Aurangabad.

*K. V. Ghosh*  
VC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

*[Signature]*

*[Signature]*



**B.C.A. IV<sup>th</sup> Semester Syllabus (CBCS)**  
**Paper No. XXI – MIS & DSS**

**Theory – 80 Marks**  
**Sessional – 20 Marks**

	<b>Lectures</b>
<b>Unit - I</b> <b>Concept, Definition, Characteristics, Objectives, Role and impact of MIS, Management as a control system, MIS: A support to the management, Application of MIS, Organization Effectiveness, Decision making concept, Decision making process, Organizational decision making &amp; MIS and decision making.</b>	<b>( 12 )</b>
<b>Unit - II</b> <b>Information: A quality product. IT enabled services, e business, wireless technologies etc. Information system in business, Computer based Information system, limitation and disadvantages of IS, Human as an Information processor, knowledge and knowledge management system, business intelligence.</b>	<b>( 12 )</b>
<b>Unit - III</b> <b>System concept and control, types of system, general model of MIS, need of system Analysis, System Development Life cycle, development process of MIS, Strategic design of MIS, Business-process, Process mode of an organization. MIS and BPR.</b>	<b>( 12 )</b>
<b>Unit - IV</b> <b>DSS: concept and Philosophy, objectives and characteristic of DSS, major functions of DSS, Components of DSS, DSS generator and tools, limitations of DSS, GDSS, components of GDSS, MIS and benefits of DSS and ONLINE DATA PROCESSING</b>	<b>( 12 )</b>
<b>Unit - V</b> <b>Knowledge system, Expert system, application of ES, benefits and Limitations of ES, ERP, ERP models and modules, benefits of ERP, ERP implementation, SCM, CRM.</b>	<b>( 12 )</b>

**Sessional Works : 20 Marks**

- College can take decisions accordingly.

**Reference Books:**

1. Decision Support & Expert System, Efraim Turban
2. W.S.Jawadekar, Management Information System
3. Dr. Akther Anwar, Fundamentals to Decision Support System
4. Dr. A.K.Gupta, Management Information System, S.Chand
5. V. Murthy, Management Information System, Himalaya publishing house. millennium edition

----- XXX -----

*Ashe*  
**Co-ordinator**  
 Modern College of Computer Science & I.T.,  
 Aurangabad.

*Kwaghmore*  
**HC Principal**  
 Modern College of Computer Science & I.T.,  
 Aurangabad.



**B.C.A. IV<sup>th</sup> Semester Syllabus (CBCS)**  
**Paper No. XXII – Business Law – II**

**Theory – 80 Marks**  
**Sessional – 20 Marks**

	<b>Lectures</b>
<b>Unit – I</b> <b>Contract Act:</b> - Special Contracts - Law of Indemnity, Guarantee Contracts, Law of Bailment & Pledge, Agency Contracts.	<b>( 12 )</b>
<b>Unit – II</b> <b>Company Law 2013 :</b> Introduction of Company Act, Meaning & Definitions, Features of Co. Act, Types of Company, Share Capital & its types, Incorporation- Formation of company, Memorandum & Articles of Association.	<b>( 12 )</b>
<b>Unit - III</b> <b>SEBI Act – 1992 :-</b> Introduction of the Act, Meaning & Definitions, Basic Characteristics of the Act, Obligation of SEBI, Issue of Capital, Discloser, Listing & its role in Stock Market.	<b>( 12 )</b>
<b>Unit - IV</b> <b>Cyber &amp; I.T. Act – 2000 (with Amendment) :</b> Need & Significance in modern era, Character & User of Internet Technology, On Line Contracts, Hacking, Phishing, Privacy Terrorism, Privacy, Section 66A	<b>( 12 )</b>
<b>Unit - V</b> <b>Micro, Small &amp; Medium Enterprises Development Act 2006 {MSMED Act - 2006} :</b> Introduction, Definitions, Features of the Act, Establishment of National Board of MSME, Power & Duties of the Board, Classification of MSME, Promotional Measures of the Act.	<b>( 12 )</b>

**Sessional Works : 20 Marks**

- |                     |   |          |
|---------------------|---|----------|
| 1. One Test         | : | 05 Marks |
| 2. One Tutorial     | : | 05 Marks |
| 3. One Seminar      | : | 05 Marks |
| 4. Group Discussion | : | 05 Marks |

**Reference Books:**

1. Mercantile of Law - N.D.Kapoor
2. Business Law - Dr.Nowlakha
3. Indian Contract Act - Dr. Avtarsingh
4. Mercantile & Industrial Law - Kuchal
5. Micro, Small & Medium Enterprises Development Act 2006{MSMED Act - 2006} - ( Law Policies & Incentive- Abha Jaiswal, IIBF, Taxman
6. HandBooks for MSME Enterprises - ICSI
7. MSME at a Glance - GOI Ministry of MSME

----- XXX -----

*Kwaghmore*  
 I/C Principal

Modern College of Computer Science & I.T.

*Ashe*  
 Co-ordinator  
 (CBCS)



**B.C.A. IV<sup>th</sup> Semester Syllabus (CBCS)**  
**Paper No. XXIII – Entrepreneurship Development**

Theory – 80 Marks  
 Sessional – 20 Marks

	Lectures
<b>Unit - I Originating Theories of Entrepreneurship -</b> Economic Theory, Sociological Theory, Psychological Theory, Innovative theory of Entrepreneurship by Joseph Schumpeter. Theory of Achievement Motivation by MC Clelland – The Kakinada Experiment. Honselitz sociological theory.	(10)
<b>Unit – II Types of Entrepreneurship -</b> Recent Trends – Sociopreneur, edupreneur, ecopreneur and agropreneur. Women Entrepreneurs, Self Help Groups.	(08)
<b>Unit - III Identification of Business Opportunities.</b> Environment scanning – meaning and benefits, Factors considered for environment scanning, Socio-cultural, economic, technical, demographic, legal and political, geographical and international factors, Sources and steps involved in identification of business opportunities.	(14)
<b>Unit - IV Market Research–</b> Meaning, need and importance of market research. Techniques in Marketing Research - Field Survey Technique, Test Marketing, Delphi Technique, Desk Research, Observation Method and Experiment Method	(14)
<b>Unit - V Innovation in Entrepreneurship –</b> Purposeful innovation – concept, need, process, principles of purposeful innovation, Incubation centres – Meaning, Services and role of incubation centres.	(14)
<b>SESSIONAL WORK: 20 Marks</b>	
1) One test 05 marks 2) One tutorial 05 marks 3) Seminar and GD 10 Marks	
<b>Reference Books :</b>	
1. Desai Vasant, Dynamics of Entrepreneurship development. 2. Drucker, Peter , Innovation and Entrepreneurship – Practice and principals. 3. Paul, Jose, Kumar Ajith. - Entrepreneurship Development and management – Himalaya Publication House. 4. Khanka, S.S. Entrepreneurship Development – Sultan Chand Publication. 5. Gupta, C.B. Shrinivasan - Entrepreneurial Development, Sultan Chand Publication.	

----- XXX -----

*Asibe*  
 Co-ordinator  
 Modern College of Computer Science & I.T.,  
 Aurangabad.

*K. V. K. K.*  
 VC Principal  
 Modern College of Computer Science & I.T.,  
 Aurangabad.



**B.C.A. IV<sup>th</sup> Semester Syllabus (CBCS)**  
**Paper No. XXIV – PC Maintenance**

**Theory – 50 Marks**  
**Practical's U/A – 50 Marks**

**Lectures**  
**( 15 )**

**Unit - I P.C. Architecture :**  
 Computer Definition, Characteristics, of computers, Basic Application of Computer, Generations of Computers. Components of Computer System, Central Processing Units(CPU), Input / Output Devices, Computer Memory, Primary and Secondary Memory, Magnetic and Optical Storage Devices, Concept of Hardware and Software, Types of Software.

**( 15 )**

**Unit – II P.C. Assembly :**  
 Opening the System, Closing the System, Tips for working inside a PC Mounting Motherboard in Cabinet, Installation of Card, Device and Then Connecting Cables, Role of CMOS Setup Basic CNOS Optimization, Hidden CMOS settings.

**( 15 )**

**Unit - III Motherboard and Processor :**  
 Study of different types of Motherboards, Motherboard Configuration, Identifying Internal and External Connectors, Types of data cables, Types of Processor – Intel Pentium IV, Dual Core, Core 2 Duo, Quad Processor, Graphics Card Types of Graphics cards.

**( 15 )**

**Practical's U/A : 50 Marks**

1. BIOS Configuration : Study of BIOS Set-up Advance set-up , Boot configuration, Boot Menu.
  2. Installation of OS – Windows XP / 7 / 10
  3. Hard Disk Formatting of Hard Disk, Partitioning of Hard Disk in different logical drives,  
 Disk Defragmentation, Disk clean up, Scan disk etc
  4. Installation of Device Drivers – Printers, Scanners etc
  5. Application Software Installation – MS Office, PDF Reader, Antivirus etc
- Subject Teacher can add more Practical's based on above syllabus.

**References Books :**

1. Computer Fundamentals ( Sixth Edition ) : P. K. Sinha
2. Troubleshooting and Maintaining Your PC All-in-One : Dan Gookin.
3. Computer System Architecture : M. Morris
4. Computer Fundamentals : Amita Goel
5. Fundamental of Computers : E. Balaguruswamy
6. PC Repair and Maintenance a practical guide : J. Rosenthal, K. Irwin
- 7.3 Easy PC Maintenance & Repair : Philip Laplante, McGraw Hill Pub.

----- XXX -----

*(Signature)*  
 Co-ordinator  
 (ABC)

*(Signature)*  
 I/C Principal



**B.C.A. IV<sup>th</sup> Semester Syllabus (CBCS)**  
**Paper No. XXIV – Advance Networking**

**Theory – 50 Marks**  
**Practical's U/A – 50 Marks**

		<b>Lectures</b>
<b>Unit - I</b>	<b>Basics of Computer Networks</b> - Computer Network, Definition, Goals, Applications, Structure, Components, Topology - Bus, Star, Ring, Mesh, Types of Networks , LAN, MAN, WAN, Internet, Broadcast & Point-To-Point Networks communication Types - Serial, Parallel, Modes of Communication : Simplex , Half Duplex , Full Duplex , Server Based LANs & Peer-to-Peer LANs ,Comparison of both, Protocols and Standards	<b>( 15 )</b>
<b>Unit – II</b>	<b>Network Models</b> - Design issues of the layer, Protocol Hierarchy , ISO-OSI Reference Model - Layers in the OSI Model , Functions of each layer, Terminology, SAP , Connection Oriented services, connectionless services , Peer Entities Internet Model (TCP/IP) , Comparison of ISO-OSI & TCP/IP Model , Addressing - Physical Addresses , Logical Addresses ,Port Addresses	<b>( 15 )</b>
<b>Unit - III</b>	<b>Transmission Media</b> - Guided Media(Wired), Coaxial Cable, Twisted Pair , Fiber Optics Cable , Unguided Media (Wireless) <b>Network Connectivity Devices</b> - Categories of Connectivity Devices, Passive & Active Hubs, Repeaters, Bridges, Transparent Bridges(Loop Problem, Spanning Tree) , Source Routing Bridges, Switches , Router, Gateways <b>Network Security Devices</b> -Firewalls, Packet-Filter firewall, Proxy firewall <b>University Practical Exam. : 50 Marks</b> Any suitable practical based on above syllabus.	<b>( 15 )</b>
	<b>Reference Books :</b> 1.Computer Networks - Andrew Tanenbaum (III Edition) 2.Internetworking Technology Handbook , CISCO System 3.Data Communications & Networking - Behrouz Ferouzan (III Edition) 4.Complete Guide to Networking - Peter Norton	<b>15</b>

----- XXX -----





**DR. BABASAHEB AMBEDKAR  
MARATHWADA UNIVERSITY,  
AURANGABAD.**



**Curriculum of**  
**BACHELOR OF COMPUTER APPLICATION**  
**(BCA)**  
**IIIIRD YEAR**  
**FIFTH SEMESTER**  
**under Choice Based Credit & Grading System**

*[ Effective from the Academic Year 2020-21 & onwards ]*

*Ashe*  
Coordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.

*Kwaghmare*  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

Consultant

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY



**CIRCULAR NO.SU/Commerce & Management/ V Sem./00/2020**

It is hereby inform to all concerned that, on the recommendation of the Dean, Faculty of Commerce & Management, the Hon'ble Vice-Chancellor in his emergency powers under section-12(7) of the Maharashtra Public Universities Act, 2016 has accepted the syllabi of **B.Com., BBA & BCA V Sem. & MPM I Sem.** under Choice Based Credit and Grading System on behalf of the Academic Council to be applied from the Academic Year 2020-2021 and onwards. The said syllabi are also available on bamu.ac.in on University website.

All concerned are requested to note the contents of this circular and bring notice to the students, teachers and staff for their information and necessary action.

University Campus,  
Aurangabad-431 004.

REF.NO. SU/ COMMERCE/2020-21/

13429-38\*

Date:- 20-07-2020.

\* \* \* \* \*

Deputy Registrar,  
Syllabus Section.

**Copy forwarded with compliments to :-**

- 1] **The Principals, affiliated concerned Colleges, Dr. Babasaheb Ambedkar Marathwada University.**
- 2] **The Director, University Network & Information Centre, UNIC, with a request to upload this Circular along with the said syllabi on University Website.**

**Copy to :-**

- 1] The Director, Board of Examination & Evaluation,
- 2] **The Section Officer, [ B.Com. Unit ] Examination Branch,**
- 3] **The Programmer [Computer Unit-1] Examinations,**
- 4] **The Programmer [Computer Unit-2] Examinations,**
- 5] The In-charge, [E-Suvidha Kendra], Rajarshi Shahu Maharaj Pariksha Bhavan, Dr. Babasaheb Ambedkar Marathwada University.
- 6] The Public Relation Officer,
- 7] The Record Keeper.

Modern College of Computer Science & I.T.,  
Aurangabad.

Modern College of Computer Science & I.T.,  
Aurangabad.







DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD.

FACULTY OF COMMERCE & MANAGEMENT

Syllabus - Bachelor of Computer Application (BCA)

Choice Based Credit System (CBCS)

Semester & Credits	Core Course [04]	Ability Enhancement Compulsory Courses [AEC] [01]	Discipline Specific Elective [DSE] [01]
V Credit 24	1. Management Accounting 2. SQL 2017 3. VB 4. Organizational Behavior	1. Software Engineering	Elective Paper [Any One] 1. Banking & Insurance OR 2. Retail Management
Total Credits 24	No. of Credits : 16	No. of Credits : 04	No. of Credits : 04

 07/07/2020  
Prof. W.K. Sarwade (Dean + BOS chairman)  
 07/07/2020  
Prof. Syed Azharuddin (Chairman BOS)  
  
Prof. Satyaprem Ghumbre (Chairman BOS)  
  
Dr. Kishor Salve (Chairman BOS)



Structure of B. C. A. Fifth Semester

Choice Based Credit Grading System (CBCS) 2020 - 21

Paper Number	Subject/ Title of the Paper	Course	Weekly		Credits		IA	UA	Total Marks	Duration of Theory Exam
			Th	Pr	Th	Pr				
XXV	Management Accounting	Core Course	4	-	4	-	20	80	100	3 Hrs
XXVI	SQL 2017	Core Course	4	-	4	-	20	80	100	3 Hrs
XXVII	VB	Core Course	4	-	4	-	20	80	100	3 Hrs
XXVIII	Organizational Behavior	Core Course	4	-	4	-	20	80	100	3 Hrs
XXIX	Software Engineering	Ability Enhancement Compulsory	4	-	4	-	20	80	100	3 Hrs
XXX	1.Banking & Insurance OR 2.Retail Management	Discipline Specific Elective [Any One]	4	-	4	-	20	80	100	3 Hrs
	<b>Total</b>		<b>24</b>	<b>-</b>	<b>24</b>	<b>-</b>	<b>120</b>	<b>480</b>	<b>600</b>	<b>--</b>

*07/07/2020*  
*07/07/2020*  
*Ashe*  
Co-ordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.

*07/07/2020*  
*Kwaghmane*  
IC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



B.C.A. V<sup>th</sup> Semester Syllabus (CBCS)  
Paper No. XXV – Management Accounting

Theory – 80 Marks  
Sessional – 20 Marks

		No. of Lectures
Unit I	<b>Introduction to Management Accounting:</b> Meaning, Definition, Features, Scope, Importance and Functions of Management Account. Differences between Management Accounting, Financial Accounting and Cost Accounting. Advantages and Limitations of Management Account. <b>(Theory only)</b>	10
Unit II	<b>Analysis and Interpretation of Financial Statements:</b> Meaning, Definition, Objectives, Scope of Financial Statements. Financial Statement Analysis, Tools of Financial Statements Analysis - Comparative financial statement, Common size financial statement, Trend Analysis. <b>(Theory only)</b>	08
Unit III	<b>Ratio Analysis:</b> Meaning, Advantages, Limitations, and Classification of ratios. Gross Profit Ratio, Net Profit Ratio, Return on Capital Employed Ratio, Inventory Turnover Ratio, Debtors & Credit Turnover Ratio, Current Ratio, Liquid Ratio, Proprietary Ratio. <b>(Numeric only)</b>	14
Unit IV	<b>Fund Flow Statement:</b> Meaning, Uses, Limitations, Sources and uses of funds. Funds from operations, Statement showing changes in working capital, Funds Flow Statement (Only in statement form), Preparation of necessary ledger accounts. <b>(Numeric only)</b>	14
Unit V	<b>Cash Flow Statement</b> Cash Flow Statement as per revised accounting standard -3 in Statement Form <b>(Numeric only)</b>	14
	<b>Practical: 20 Marks (to be conducted by the department in each college as per convenience)</b> <b>Sessional Work: 20 Marks (Based on Unit II, III and IV)</b> 1. To Collect the Financial Statements of Companies published in News Papers (05 Companies). 2. Calculate Profitability and Financial Ratios (One case). 3. Prepare Statement of Changes in Working Capital and Funds Flow Statement (One Case) i. 10 Marks for above mentioned work. ii. 10 Marks for Group Discussion and Seminar	
	<b>Reference Books :</b> 1. Dr. S.N. Maheshwari – Principles of Management Accounting, Sultan Chand & Sons, Delhi 2. Prof. A.P. Rao – Management Accounting – Everest Publishing House, New Delhi 3. Khan M.Y. & Jain P.K. - Management Accounting Tata McGraw-Hill Education 4. Dr. Jitendra Ahirrao - Management Accounting – Kailas Publications Aurangabad. 5. Dr. V.R. Nagori & Dr. Sanjay Agrawal - Management Accounting – Chinmay Publications Aurangabad.	

----- XXX -----

*Ashe*  
*(Asst. Co-ordinator)*  
Co-ordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.

*K. S. Ghosh*  
VC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



B.C.A. V<sup>th</sup> Semester Syllabus (CBCS)  
Paper No. XXVI – SQL 2017

Total marks – 100

Theory – 80 Marks  
Sessional – 20 Marks

		No. of Lectures
Unit I	<b>Introduction To DBMS:</b> Database Management System (DBMS) and Data Models. Introduction to Basic Database, Advantages of DBMS, Exploring Relational DBMS, Understanding Client and Server, Introduction to TSQL (Transact-Structured Query Language), History and Features of TSQL, Types Of TSQL Commands	12
Unit II	<b>Introduction to SQL Server:</b> Advantages and Drawbacks of SQL Server, Comparison between SQL Server and Oracle, Installation steps of Server, Connecting to Server, Server Type, Server Name, Authentication Modes, SQL Server Authentication Mode, Windows Authentication Mode, Login and Password, SQL Server Management Studio and Tools in Management Studio, Object Explorer, Object Explorer Details, Query Editor	12
Unit III	<b>Transaction Management:</b> Transaction Concepts, Begin Transaction, Commit Transaction, Rollback Transaction, Save Transaction, Role of Log File in Transaction Management, Implicit Transaction, Schedules.	12
Unit IV	<b>Concurrency Control :</b> Introduction Concurrency Control, Need for Concurrency, Locking Protocols, Transaction Recovery, Save Points Isolation Levels, SQL Facilities for Concurrency and Recovery.	12
Unit V	<b>File Structure and Indexing :</b> Operations on files, File of Unordered and ordered records, overview of File organizations, Indexing structures for files (Primary Index, Secondary Index, Clustering Index), Multilevel Indexing using B and B+ trees	12
	<b>Practical's U/A : 20 Marks</b>  1. Test/ Tutorial : 10 Marks 2. Oral / Writing of Algorithms in Journal / File : 10 Marks  <b>Reference Books :</b> 1. A Silberschatz, H Korth, S Sudarshan, "Database System and Concepts", fifth Edition McGraw-Hill. 2. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education, 2010. 3. Rob, Coronel, "Database Systems", Seventh Edition, Cengage Learning 4. C.J.Date, A.Kannan, S.Swamynathan, —An Introduction to Database Systems, Eighth Edition, Pearson Education, 2006. 5. Raghu Ramakrishnan, —Database Management Systems I, Fourth Edition, McGraw-Hill 6. G.K.Gupta, Database Management Systems, Tata McGraw Hill 7. Database Systems- A practical approach to Design, Implementation and Management by Thomos Connolly, Carolyn Begg, 3rd Edition, Pearson Education.	

----- XXX -----

Co-ordinator  
07/07/2020  
Modern College of Computer Science & I.T.,  
Aurangabad.

4  
[Signatures]

Kwaghmare  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



B.C.A. V<sup>th</sup> Semester Syllabus (CBCS)  
Paper No. XXVII – VB

Total - 100 marks

Theory – 80 Marks  
Sessional – 20 Marks

Visual Basic

		No. of Lectures
Unit I	<b>Introduction to Visual Basic :</b> Introduction, Integrated Development Environment Overview, Introduction Graphical User Interface (GUI), Programming Language (Procedural, Object Oriented, Event Driven), How to use VB, edition, installation	10
Unit II	<b>Introduction to Visual Basic Programming:</b> Introduction, Visual Programming and Event-Driven Programming, A Simple Program: Printing a Line of Text on the Form, Variables, Variables Public, Private, Static, Constants, Data Types, Naming, rules/conventions, Constants, Named & intrinsic, Declaring variables, Scope variables, Val Function, Arithmetic Operations, Formatting Data. Branching and Looping Statement: If, Select Case, Iterations :While, For, Until	12
Unit III	<b>Arrays and Procedures, Functions :</b> Types of array, control array, Built in and user defined function OOPs in VB : Classes, creating a new Class, Creating a new object using a class, choosing when to create New Objects, The Initialize & Terminate events, Inheritance. <b>Exception handling:</b> Introduction, When Error Handling Should be Used, A Simple Error-Handling Example: Divide by Zero, Nested on Error Statements. Error Object, and Resume Statement. Event handling: Mouse handling	12
Unit IV	<b>Basic Graphical User Interface Concepts:</b> Introduction to forms and Controls: Introduction, Creating , adding, removing Forms in project, Hide, Show Method, Load, Unload Statement, Me Keyword, Referring to Objects on a Different Forms. Adding controls on form Working with Properties and Methods of each Controls (Text Box Control, MaslEdit Control, Combo Box Control, List Box Control, Scrollbars, Slider Control, Menus, Pop-Up Menus, Function MsgBox), Creating an application <b>MENU :</b> Creating a menu system, Creating and accessing pop-up menu, Modifying menus at runtime, adding menu items at run-time, data access methods, creating, reading and writing text files	14
Unit V	Data Control , Connectivity with SQL server , Operations of database through coding , ADO Data Control , Advantages of ADODC over DC , Studying the properties and Methods of ADODC , Connectivity with SQL server ,Report Generation , Developing ADO application through ADODC and coding , Report Generation	12
	<b>Sessional Works : 20 Marks</b> • College can take decision accordingly as per their convenience.	
	<b>Reference Books:</b> 1. Mastering Visual Basic 2. Visual Basic Black Book	

----- XXX -----

*(Handwritten signatures and dates)*

*(Handwritten signature)*  
Coordinator

Modern College of Computer Science & I.T.,  
Aurangabad.

*(Handwritten signature)*  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

B.C.A. V<sup>th</sup> Semester Syllabus (CBCS)  
Paper No. XXVIII – Organizational Behavior

Total - 100 Marks  
Theory - 80 Marks  
Sessional - 20 Marks

		No. of Lectures
Unit I	<b>Evolution of Management thought:</b> Classical School to Contingency School. Contribution of Management thinkers and proponents: Fredrick Taylor, Max Weber, Henri Fayol, Frank and Lillian Gilbreth, Henry Gantt, Elton Mayo and others. OB Studies and Experiments: Classical Conditioning Theory, Hawthorne Studies and others.	12
Unit II	<b>Individual Dynamics – I</b> Personality: Conceptualization, Discussions on Type vs. Trait Theory and Nature vs. Nurture Type Theory: Freud's Theory of Psychosocial Stages, Carl Jung's Theory of Personality, Theory X vs. Theory Y and others. Trait Theory: Myer-Brigg's Trait Indicator, Big-Five Personality Traits and others.	12
Unit III	<b>Individual Dynamics - II</b> Theories of Motivation: Maslow's Hierarchy of Needs Theory, Herzberg's Two-Factor Theory, McClelland Human Motivation Theory, Alderfer's ERG Theory, Vroom's Expectancy Theory, Adam's Equity Theory, Skinner's Reinforcement Theory, Locke's Goal Setting Theory, Deci and Ryan's Cognitive Evaluation Theory	12
Unit IV	<b>Group Dynamics</b> Communication: Concept, Process, Communication channels, Barriers and Implications for Managers, Group Development: Definition, Foundations of Group Behavior, Bruce Tuckman's Stages of Development, Group Properties (roles, norms, status, size and cohesiveness) Decision Making: Group vs. Individual Decision Making, Group decision making techniques, Stages and Process of Decision Making	14
Unit V	<b>Organizational System</b> Organizational Structures: Concept, Design Types, Chain of Command, Span of Control, Centralization vs. Decentralization. Stress Management: Concept of Work Stress, Emotional Intelligence, and Measures for managing stress. Managing Stress related to Business & Employment in Post COVID-19 Era. <b>Sessional Works : 20 Marks</b> 1. Group Discussion : 10 Marks 2. Test / Tutorial : 10 Marks	10
<b>Reference Books:</b> 1. Robbins, S., Judge, T., & Vohra, N. (2016). Organizational Behavior. (16e, Ed.) Mullins, L. J. (2010). Management and Organizational Behaviour. (9th, Ed.) 2. Bratton, J. (2016). Introduction to Work and Organizational Behaviour. (3rd, Ed.) 3. Butler, M., & Rose, E. (Eds.). (n.d.). Introduction to Organisational Behaviour. 4. Aswathappa, K. (2017). Organisational Behaviour. (12th, Ed.) 5. Rollinson, D. (2008). Organisational Behaviour and Analysis: An Integrated Approach. (4th, Ed.)		

----- xxx -----

*Ishe*  
Co-ordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.

*Kwaghmane*  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



B.C.A. V<sup>th</sup> Semester Syllabus (CBCS)  
Paper No. XXIX – Software Engineering

Total - 100 marks

Theory – 80 Marks  
Sessional – 20 Marks

		No. of Lectures
Unit I	Overview of systems Analysis and design System concepts : Types of systems: Information System, System Development Life cycle. Role & Skills of system Analyst, Models: 1) Waterfall 2) Prototyping 3) Spiral ( including WIN-WIN Spiral) 4) RAD 5) Group Based Approach: JAD 6) Object Oriented methodology	12
Unit II	A) Current trends in Software Engineering : 1 Software Engineering for projects & products. 2 Introduction to Web Engineering and Agile process B) Information requirement Analysis: 1) Decision Analysis Tools: Decision Tree, Decision Table, Structured English 2) Functional Decomposition Diagram 3) Process modeling with physical and logical Data Flow Diagrams 4) Data Dictionary Case Studies on Decision analysis tools , FDDs, DFDs should be covered	14
Unit III	Software Analysis : Requirements Engineering; Feasibility Study : economical, operational, social, technical; Requirements Elicitation; Requirements Analysis; Requirements Validation and Management. Size Estimation; Cost Estimation Models; COCOMO, COCOMO II; Software Risk Management. Activities in Requirements Determination : a) Requirements Anticipation b) Requirements Investigation c) Requirements Specifications	14
Unit IV	Software requirement Specification (SRS) : 1] Structure and contents of the requirements specification analysis modeling, types of requirements - functional and non-functional , Quality criteria, requirements definition .SRS format, Fundamental problems in defining requirements. 2] Structure and standards followed for SRS. 3] characteristics of good SRS – Unambiguous, complete, verifiable, consistent, modifiable, traceable, usable during maintenance	12
Unit V	Maintenance : Types of Maintenance. Maintenance Cost, Reverse Engineering, Introduction to legacy systems, Documentation : Types, Role of documentation maintenance	10
	SESSIONAL WORK: 20 Marks College can take decision as per their convenience.	
	Reference Books : 1. System Analysis and Design by Jalote 2. Software Engineering by Sommerville 3. Software Engineering - W S Jawadekar 4. System Analysis & Design methods – Whiten, Bentley 5. System Analysis & Design – Elias Awad 6. Object Oriented Modelling & Design – James Rumbaugh 7. Analysis & Design of Information System – James Semm 8. Analysis & Design of Information System – V. Rajaraman 9. Software Engineering Concepts-Richard Fairley	

----- XXX -----

*(Handwritten signatures and dates)*  
07/07/2020  
07/07/2020

*(Handwritten signature)*  
Co-ordinator  
(CBCS)

Modern College of Computer Science & I.T.,  
Aurangabad.

*(Handwritten signature)*  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



B.C.A. V<sup>th</sup> Semester Syllabus (CBCS)  
Paper No. XXX – Banking & Insurance (Elective)

Total- 100 marks

Theory – 80 Marks  
Sessional – 20 Marks

		No. of Lectures
Unit I	<b>Banking in India</b> : Meaning and definition of Bank, Banking and Banking Company. Commercial Banks: Introduction, Structure of Commercial Banks in India, functions, credit creation by commercial Banks, Principle of liquidity and profitability. <b>Co-operative Banks</b> : Introduction, Structure, organization and management, progress and problems. <b>Regional Rural Banks</b> : Introduction, objectives, organization and management, progress and problems.	10
Unit II	<b>Reserve Bank of India</b> The Reserve Bank of India: Introduction, organization and management General functions, regulation of money and credit supply, credit control measures	08
Unit III	<b>Banker and Customer</b> The relationship between Banker and Customer, general relationship — special relationship, statutory obligation to honor Cheque - Bankers lien. Duty to maintain secrecy of customers' account, right to claim incidental charges, right to charge compound interest. Banking Ombudsman.	10
Unit IV	<b>Account of Customers</b> : i) General precautions for opening accounts, KYC (Know Your Customer), Types of deposit accounts, fixed deposit receipt, nomination, TDS. . ii) Special types of customers. minor, married women, Lunatic; Partnership, Joint stock companies unincorporated bodies. Executor and Administrators. Trusts Accounts, Joint Accounts. iii) Principles of sound lending, secured and unsecured advances, Forms of advances, iv) Modes of charging security: Lien, Pledge, Mortgage, Assignment, Hypothecation,	10
Unit V	<b>Electronic Banking (E-Banking)</b> : Introduction, Traditional banking v/s E-Banking, electronic delivery channels (ATMs, Smart cards, mobile banking, internet banking,) t-banking transaction, Truncated cheques and electronic cheques, MCgh product, Advantages of Banking, constraints in E-Banking, security measures, RTGS & NEFT. E-Banking During & Post COVID-19 Pandemic.	10
Unit VI	<b>Insurance</b> : Concept and importance of Insurance, Principles of Insurance, Growth & Development of Indian Insurance Industry – Regulations of Insurance Business and The Emerging Scenario – Introduction to Life & General Insurance – Life Insurance: Features of Life Insurance – Essentials of Life Insurance Contract – Kinds of Insurance Policies - Premium determination – Life Policy Conditions, Risk and Insurance.	12
<b>Sessional Marks : 20 Marks</b>		
1. Test / Tutorial : 10 Marks		
2. Preparing Instruments of Bank/ Insurance as per convenience. : 10 Marks		
<b>References Books :</b>		
1 Cordon & Natarajan, Banking Law and Practice 2008, Himalaya Publishing Mumbai.		
2 Insurance Laws and Practices, Excel Books Private Limited, A-45, New Delhi.		
3 KC. Shekher: Banking Theory & practice, Vani Educational Books, Sahibabad (U.P).		
4 Read, E.W., Commercial Bank Management, Harper and Row Publisher New York.		

----- XXX -----

07/07/2020  
07/07/2020

Ashe  
Coordinator  
Modern College  
Aurangabad.

Kwaghmare  
I/C Principal  
Modern College of Computer Studies  
Aurangabad.



B.C.A. V<sup>th</sup> Semester Syllabus (CBCS)  
Paper No. XXX – Retail Management (Elective)

Total - 100 marks

Theory – 80 Marks  
Sessional – 20 Marks

		No. of Lectures
Unit V	<b>Introduction to Retailing:</b> Meaning, Definition, Scope of Retailing, Role and Functions of retailers, Advantages of Retailing, Organized and Unorganized Retailing, Indian Retail Scenario Vs. Global Retail Scenario, Role of Retail in Nation's Economy	12
Unit V	<b>Theories and Formats of Retailing:</b> 1. Environmental Theory 2. Cyclical Theory 3. Conflictual Theory. Formats of Retailing Store based, Non store and Service retailing	12
Unit V	<b>Retailing Planning and Development:</b> Understanding the Retail Customer Marketing Research for Retailing, Strategic Retail Planning Process, - Retail Strategies: Growth Strategies Positioning a retail outlet; developing a retail brand strategy, expansion strategy, pricing strategy, Retail Location and Site Selection.	12
Unit V	<b>Merchandise Management:</b> Meaning of Merchandising, Factors influencing Merchandising, Basics & Types of Retail Merchandising, Concept & Process of merchandise Planning, Methods of Merchandise Procurement. Retail Pricing and Evaluating.	12
Unit V	<b>Retail HRM &amp; New Trends in Retailing:</b> Identifying Manpower requirements, Recruitment, Selection & Training, Emerging Trends in Retailing in India, Technology in Retailing, Non store retailing (e-retailing) - The Impact of Information Technology in retailing, Legal aspects in retailing, Social issues in retailing, Ethical issues in retailing. Innovative Retail During & Post COVID-19 Pandemic.	12
	<b>Sessional : 20 Marks</b> 1. Test / Tutorial : 10 Marks 2. Preparing Market Research Plan of Product : 10 Marks	
	<b>Reference Books :</b> 1. Retailing Management : Michael Levy and Barton Weitz, TMGH, 5th Edition 2. Retail Management: Swapna Pradhan, TTMGH 3. Retail Management – Chetan Bajaj; Rajnish Tuli; Nidhi Varma - Oxford ks 4. Fundamentals of Retailing: K V S Madaan, McGraw Hill 5. Retail Marketing Management: David Gilbert, Pearson Publication 6. Retail Management : Arif Sheikh, Himalaya Publishing	

----- XXX -----

07/07/2020  
07/07/2020

Ashe  
Coordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.

Swaghamore  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad



**DR. BABASAHEB AMBEDKAR  
MARATHWADA UNIVERSITY,  
AURANGABAD.**



**Curriculum of**  
**BACHELOR OF COMPUTER APPLICATION**  
**(BCA)**  
**IIIIRD YEAR**  
**SIX SEMESTER**  
**under Choice Based Credit & Grading System**

[ *Effective from the Academic Year 2020-21 & onwards* ]

*[Handwritten signatures]*

*[Handwritten signature]*  
Modern College of Computer Science & I.T.,  
Aurangabad.

*[Handwritten signature]*  
Modern College of Computer Science & I.T.,  
Aurangabad.

Circular file

**DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY**



**CIRCULAR NO.SU/Commerce & Management/B.C.A.VI Sem./39/2021**

It is hereby inform to all concerned that, on recommendation of the Dean & Chairman of BOS Faculty of Commerce & Management, the Hon'ble Vice-Chancellor in his emergency powers under Section-12(7) of the Maharashtra Public Universities Act, 2016 has accepted the revise **Paper Software Testing of B.C.A. VI Sem.** under Choice Based Credit & Grading System on behalf of the Academic Council to be applied from the Academic Year 2020-2021 and onwards.

All concerned are requested to note the contents of this circular and bring notice to the students, teachers and staff for their information and necessary action.

University Campus,  
Aurangabad-431 004.

REF.NO. SU/ COMMERCE/2020-21

32330-39

Date:- 25-06-2018.

\* \* \* \* \*

*[Signature]*  
**Deputy Registrar,  
Academic Section  
Syllabus unit.**

**Copy forwarded with compliments to :-**

- 1] **The Principals, affiliated concerned Colleges, Dr. Babasaheb Ambedkar Marathwada University.**
- 2] **The Director, University Network & Information Centre, UNIC, with a request to upload this Circular on University Website.**

**Copy to :-**

- 1] The Director, Board of Examination & Evaluation,
- 2] **The Section Officer, [ B.Com. Unit ] Examination Branch,**
- 3] The Section officer, [Eligibility Unit],
- 4] **The Programmer [Computer Unit-1] Examinations,**
- 5] **The Programmer [Computer Unit-2] Examinations,**
- 6] The In-charge, [E-Suvidha Kendra], Rajarshi Shahu Maharaj Pariksha Bhavan, Dr. Babasaheb Ambedkar Marathwada University.
- 7] The Public Relation Officer,
- 8] The Record Keeper.

*[Signature]*  
**Co-ordinator**

Modern College of Computer Science & I.T.,  
Aurangabad.

*[Signature]*  
**VC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.**




DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD.

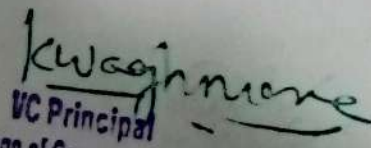
FACULTY OF COMMERCE & MANAGEMENT.

Syllabus - Bachelor of Computer Application (BCA)

Choice Based Credit System (CBCS)

Semester & Credits	Core Course [04]	Ability Enhancement Compulsory Courses [AEC] [01]	Discipline Specific Elective [DSE] [01]
VI Credit 24	1. Element of Commercial Portal (HTML 5) 2. Android 9 3. Business Law - III 4. Project	1. Software Testing	Elective Paper [Any One] 1. Services Marketing OR 2. Export Management
Total Credits 24	No. of Credits : 16	No. of Credits : 04	No. of Credits : 04

  
Co-ordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.

  
VC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad



Structure of B. C. A. Sixth Semester  
Choice Based Credit Grading System (CBCS) 2019 - 2020

Paper Number	Subject/ Title of the Paper	Course	Weekly		Credits		IA	UA	Total Marks	Duration of Theory Exam
			Th	Pr	Th	Pr				
XXXI	Elements of Commercial Portals (HTML 5)	Core Course	4	-	4	-	20	80	100	3 Hrs
XXXII	Android 9	Core Course	4	-	4	-	20	80	100	3 Hrs
XXXIII	.Business Law III	Core Course	4	-	4	-	20	80	100	3 Hrs
XXXIV	Project	Core Course	4	-	4	-	20	80	100	3 Hrs
XXXV	Software Testing	Ability Enhancement Compulsory	4	-	4	-	20	80	100	3 Hrs
XXXVI	1.Services Marketing OR 2.Export Management	Discipline Specific Elective [Any One]	4	-	4	-	20	80	100	3 Hrs
	<b>Total</b>		<b>24</b>	<b>-</b>	<b>24</b>	<b>-</b>	<b>120</b>	<b>480</b>	<b>600</b>	<b>--</b>

B.C.A. VI<sup>th</sup> Semester Syllabus (CBCS)  
Paper No. XXXI – Elements of Commercial Portals (HTML 5)

*Asibe*  
(A.D.C.)  
Coordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.

*Kwaghmare*  
VC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

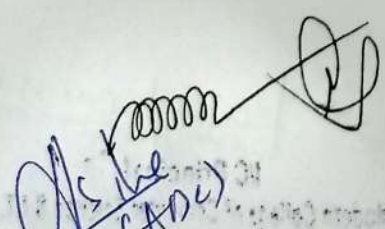


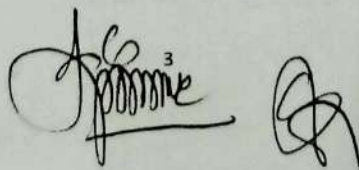
Theory – 80 Marks  
Sessional – 20 Marks

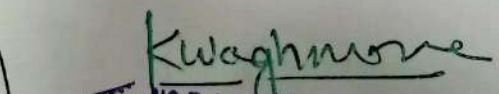
**Objectives:**

- Student will be able to know the elements of commercial portals with XML, JQuery and other details.

	No. of Lectures
<b>Unit HTML 5</b>	<b>10</b>
<b>I</b> Introduction , form elements – Date, Date Time, Email, Number, Range, Tel, Color, URL, Date Time Local, Month , Week, Time, Placeholder Attribute, Autofocus Attribute, Required Attributes , HTML Audio , Video	
<b>Unit XML</b>	<b>08</b>
<b>II</b> 2.1 Concept of XML, features of XML 2.2 Writing XML elements attributes etc. 2.3 XML with CSS, programs on it. 2.4 XML with DSO, programs on it. 2.5 XML Namespace, XML DTD, programs on it. 2.6 XML schemas, writing simple sheet using XSLT 2.7 SAX Parser, DOM Parser 2.8 Introduction to SOAP, Examples of XML	
<b>Unit jQuery - I</b>	<b>14</b>
<b>III</b> 3.1 Introduction to jQuery, Syntax Overview 3.2 Anatomy of a jQuery Script, Creating first jQuery script 3.3 Traversing the DOM, Selecting Elements with jQuery, 3.4 Refining & Filtering Selections, Selecting Form Elements 3.5 Working with Selections - Chaining, Getters & Setters 3.6 CSS, Styling, & Dimensions 3.7 Manipulating Elements - Getting and Setting Information about Elements, Moving, Copying, and Removing Elements, Creating New Elements	
<b>Unit jQuery - II</b>	<b>14</b>
<b>IV</b> 4.1 Manipulating Attributes, Utility Methods 4.2 Events - Connecting Event to Elements, Namespacing Events, Event handling, Triggering Event handlers, Event Delegation 4.3 JQuery Effects –hide/show, fade, slide, animate, callback, stop 4.4 Interactions – Draggable, Droppable, Resizable, Selectable, Sortable 4.5 Widgets - Accordion, DatePicker, Menu, Tabs 4.6 Plugins - Using readymade plugins, Create a basic plugin, Writing Plugins	
<b>Unit AJAX</b>	<b>14</b>
<b>V</b> 5.1 AJAX Overview 5.2 jQuery's AJAX related methods, 5.3 Ajax and Forms 5.4 Ajax Events <b>Practical: 20 Marks (to be conducted by the department in each college as per convenience)</b> <b>Sessional Work: 20 Marks (Based on Unit II, III and IV e.g. HTML 5 , XML , JQuery and AJAX)</b>	

  
Coordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.



  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.





**Text Books :**

1. HTML, DHTML, JavaScript, Perl & CGI Ivan Bayross
2. HTML & CSS : The Complete reference, Fifth Edition By Thomas Powell

**Reference Books :**

1. Html, Xhtml. And Css Bible (English) 5th Edition (paperback) by Schafer, Steven
2. HEAD FIRST HTML AND CSS, 2/ED (UPDATED FOR HTML) by ROBSON
3. Beginning HTML and CSS (English) (Paperback) by Rob Larsen
4. Learn to Code HTML and CSS (English) (Paperback) by Howe
5. Head First HTML5 Programming by Elisabeth Freeman and Eric Freeman
6. Introducing HTML5 - Bruce Lawson, Remy Sharp
7. AngularJS - Brad Green, Shyam Seshadri
8. Learning jQuery - Jonathan Chaffer, Karl Swedberg
9. Professional Ajax, 2nd Edition Wrox Press
10. Internet Technology at work Hofstetter fred, TMH.
11. Beginning XML Wrox Press
12. XML how to program Deitel & Deitel, Pearson Pub.
13. Programming the World Wide Web Robert W. Sebesta, Pearson, 4th Ed.

**Web references:**

1. [www.w3school.com](http://www.w3school.com)
2. [www.tutorialpoint.com](http://www.tutorialpoint.com)

----- XXX -----

**B.C.A. VI<sup>th</sup> Semester Syllabus (CBCS)**  
**Paper No. XXXII – Android 9**


**Theory – 80 Marks**  
**Sessional – 20 Marks**

**Objectives:**

1. To facilitate students to understand Android SDK & Basics of Android Application Development.

4

  
**Coordinator**  
Modern College of Computer Science & I.T.,  
Aurangabad.

  
**I/C Principal**  
Modern College of Computer Science & I.T.,  
Aurangabad.



2. To impart working knowledge of Android Studio development tool.

	No. of Lectures
<b>Unit Environment Setup:</b>	12
I Developing for android installing the android SDK, Installing the updates to the SDK, Android Development Tools (ADT) Plugin, developing with Eclipse. Create Android Application, Create Android Virtual Device, and Architecture: Linux kernel, Libraries, Android Runtime, and Application Framework.	
<b>Unit Application Components:</b>	12
II Application Components Activities, Services, Broadcast Receivers, content Providers. Anatomy of Android Application, The Main Activity File, The Manifest File, The Strings File, The R File, The Layout File, Running the Application.	
<b>Types Of Android Application:</b> Foreground Application, Background Application, Intermittent Application.	
<b>Unit Resources Organizing &amp; Accessing:</b>	12
III Alternative Resources, Accessing Resources. The Dalvik Debug Monitor Service, The Android Debug Bridge.	
<b>UI Layouts:</b> Android Layout Types, Relative Layout Attributes, Grid View Attributes, Sub-Activity, Layout Attributes, View Identification, UI Controls, Android UI Controls, TextView Attributes, AutoComplete Text View Attributes, Button Attributes, ImageButton Attributes, CheckBox Attributes, ToggleButton Attributes, RadioButton Attributes, RadioGroup Attributes	
<b>Unit Intents and Filters:</b>	12
IV Intent Objects, Action, Android Intent Standard, Actions, Data, Category, Extras, Flags, Component Name, Types of Intents: Explicit Intents, Implicit Intents. Externalizing Resources, Android Application Life Cycle.	
<b>Fragments:</b> Creating New Fragments, The Fragment Life-Cycle, Fragment States, Adding Fragments to Activities.	
<b>Unit Event Handling:</b>	12
V Event Listeners & Event Handlers, Event Listeners Registration, Styles and Themes, Defining Styles, Using Styles, Style Inheritance, Android Themes, Default Styles & Themes, Custom Components, Creating a Simple Custom Components.	


### Practical's U/A : 20 Marks

Sessional Work	: 20 Marks
Test /Practical	: 10 Marks
Tutorial/ Programming File	: 10 Marks

### Reference Books :

1. Android in Practice - Charlie Collins, Michale Galpin, Matthias Kaeppler – Manning Publications 2012
2. Steele J.: The Android Developer's Cookbook: Building Applications with the Android SDK., Addison-Wesley Professional, 2010
3. Conder S., Darcey L.: Android Wireless Application Development, 3rd edition, Addison-Wesley Professional 2012
4. Professional Andriod 4 Application Development: Retomeier, Wrox Publication.

### Web Reference:

  
Co-ordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.



  
VC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



Android Tutorial, Simply Easy Learning by tutorialspoint.com.  
Link: [http://www.tutorialspoint.com/android/android\\_tutorial.pdf](http://www.tutorialspoint.com/android/android_tutorial.pdf)

--- xxx ---

**B.C.A. VI<sup>th</sup> Semester Syllabus (CBCS)**  
**Paper No. XXXIII – Business Law III**

**Theory – 80 Marks**  
**Sessional – 20 Marks**

**Objectives:** To acquaint students about the concept of Laws in India, with latest Amendments.

**Unit 1 Information Technology Act 2000**

**No. of Lectures**  
**12**

- Cyber Crime : Meaning and Nature
- Terms used in Cybercrime : Hacking, Phishing, Preachers, Cyber Space, IP Spoofing, Leapfrog Attack ; Meaning and its effects on Cyber users
- Teenage Web Vandals, Cyber Fraud, Virus on the Internet, Defamation, Harassment and E-mail Abuse, Cyber Pornography, Other IT Act Offences
- Monetary Penalties, Adjudication and Appeals under IT Act 2000
- Jurisdiction and Criminal Justice in India, Strategies to handle cybercrime and trends

  
**Co-ordinator**

**Modern College of Computer Science & I.T.,**  
**Aurangabad.**





  
**I/C Principal**  
**Modern College of Computer Science & I.T.,**  
**Aurangabad.**



<b>Unit II IT Contracts and Standards</b>	12
<ul style="list-style-type: none"><li>• Contracts in the InfoTech World, Contract Formation on Internet, Terms and Conditions on Contracts</li><li>• NIST : National Institute of Standards and Technology ; Objectives and working</li><li>• Copyright - Meaning, Ownership and Assignment, License of Copyright, Copyright Protection of Content on the Internet</li></ul>	
<b>Unit III Security Tools and Technologies and Services</b>	12
<ul style="list-style-type: none"><li>• Firewall, Denial of Services (DoS), Digital Signature, Digital Signature Certificate, Packet sniffer, SSL, HTTPS, Pen Register</li><li>• CERT : Computer Emergency Response Team : Introduction and Objectives</li></ul>	
<b>Unit IV Cyber Security and Protection to Cyber Users</b>	12
<ul style="list-style-type: none"><li>• National Cyber Security Policy 2013 – Cyber security : meaning; NCSP 2013 - meaning, Aim and Objectives, Reasons of NCSP 2013, Strategies NCSP 2013</li><li>• NSA : National Security Agency – case study</li></ul>	
<b>Unit V Consumer Protection Act 1986 (with Amendments 2019)</b>	12
<ul style="list-style-type: none"><li>• Essential terms in Consumer Protection Act, Consumer Complaint, Defects in Goods and Services, Restrictive and Unfair Trade Practices, Instance of Unfair Trade Practices, Reliefs under CPA, Consumer Forum, Jurisdiction and Implications in India. E-Commerce Transactions, E-Filing of Complaints, Product Liability and Penal Consequences.</li></ul>	

**Sessional Works : 20 Marks**

Tests : 10 Marks

Tutorials

: 10 Marks

**Reference Books:**

1. Dr. Avtar Singh : Company Law; Eastern Book Company, 34, Lalbagh, Lucknow.
2. C.R. Datta : Datta on the Company Law; Lexis Nexis, Butterworths Wadhwa, Nagpur
3. A. Ramaiya : Guide to the Companies Act; Lexis Nexis, Butterworths Wadhwa, Nagpur
4. Corporate Law- Bharat Law House Pvt Ltd. New Delhi.
5. Desai. T.R. Indian Contract Act, S.C. Sarkar and sons Pvt.Ltd

— xxx —

**B.C.A. VI<sup>th</sup> Semester Syllabus (CBCS)**

**Paper No. XXXIV – Project**

**Theory – 80 Marks**

**Project Report – 20 Marks**

**Objectives:**

- As per the syllabi of BCA, each student has to go for Research Project selecting a topic from his/her specialization area or Area of Interest.

**Types Of Project:**

**(20 Lectures)**

The Project may be taken on any one of the following areas:

1. The project should be done in core specialization area of B.B.A course only.
2. Comprehensive case study (covering single organization/multifunctional area problem, formulation analysis and recommendations)
3. Inter-organizational study aimed at inter-organizational comparison/ validation of theory/survey of management services.
4. Evolution of any new conceptual / theoretical framework.
5. Field study (empirical study).

  
Co-ordinator

Modern College of Computer Science & I.T.,  
Aurangabad.

  
I/O Principal

Modern College of Computer Science & I.T.,  
Aurangabad.



6. The project can be based on primary or secondary data or both as well.

(20 Lectures)

**Contents of Project Synopsis:**

The synopsis must be submitted containing the following contents:

- i) Title of the project.
- ii) Review of literature and Problem Statement.
- iii) Objectives of the proposed study.
- iv) Research Methodology (Sources of data, Sampling, Tools of analysis etc.)
- v) Scope/Relevance of Proposed Study.
- vi) Proposed Questionnaire (if any).
- vii) References.

**Main Project:**

(20 Lectures)

**Contents of Project Report:**

- 1) Introduction and Rationale of the topic chosen
- 2) Objectives of the study
- 3) Literature Review and problem formulation.
- 4) Research Methodology.
- 5) Analysis/discussion and interpretation of Data.
- 6) Conclusions/findings and recommendations/Suggestions.
- 7) References/Bibliography.
- 8) Appendix.
  - a) Questionnaire, if any
  - b) Interview schedule, if any
  - c) List of the companies surveyed.
  - d) Raw data, if the candidate wants to submit
  - e) Graphs/Diagrams etc.
  - f) Any other document relevant to the study

**Project Report : Students are expected to prepare model Project Report 20 Marks**

— x x x —

*Ashe*  
Co-ordinator  
MCCSIT

Modern College of Computer Science & I.T.,  
Aurangabad.

*Koaghmane*  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

**B.C.A. VI<sup>th</sup> Semester Syllabus (CBCS)**  
**Paper No. XXXV – Software Testing**



<b>Subject Title</b>	Software Testing		
<b>Subject Ref. No.</b>		<b>No. of Credits</b>	4
		<b>No. of Periods / Week</b>	4
		<b>Assignments / Sessional</b>	20
		<b>Semester Examination</b>	80
<b>Course Objective</b>	After completing this course students will be able to: · Understand the different types of testing , testing life cycle ,test case writing etc.		
<b>Pre Requisite</b>	Students must have knowledge of Software development life cycle.		
<b>Course Outcome</b>	At the end of the course, students will be able to:		
	CO-1	Understand different testing types associated with software.	
	CO-2	Identify the importance of black box and white box testing	
	CO-3	Design Test case for software.	
	CO-4	Perform manual testing to uncover different classes of errors.	
<b>Unit - I</b>	<b>Introduction</b> Fundamentals of Testing 1.1 What is Testing? 1.1.1 Typical Objectives of Testing 1.1.2 Testing and Debugging Why is Testing Necessary? Testing's Contributions to Success 1.2.2 Quality Assurance and Testing 1.2.3 Errors, Defects, and Failures 1.2.4 Defects, Root Causes and Effects 1.3 Seven Testing Principles 1.4 Test Process 1.4.1 Test Process in Context 1.4.2 Test Activities and Tasks 1.4.3 Test Work Products 1.4.4 Traceability between the Test Basis and Test Work Products 1.5 The Psychology of Testing 1.5.1 Human Psychology and Testing 1.5.2 Tester's and Developer's Mind-set		
<b>Unit - II</b>	<b>Testing Throughout the Software Development Lifecycle</b> 2.1 Software Development Lifecycle Models 2.1.1 Software Development and Software Testing 2.1.2 Software Development Lifecycle Models in Context 2.2 Test Levels 2.2.1 Component Testing 2.2.2 Integration Testing		

*[Handwritten signature]*

*Dr. Wajkar. Y.A.*  
 B.C.A. VI<sup>th</sup> Sem.  
 (Syllabus)

*[Handwritten signature]*

*[Handwritten signature]*  
 Co-ordinator

*[Handwritten signature]*  
 VC Principal



	<ul style="list-style-type: none"><li>2.2.3 System Testing</li><li>2.2.4 Acceptance Testing</li><li>2.3 Test Types<ul style="list-style-type: none"><li>2.3.1 Functional Testing</li><li>2.3.2 Non-functional Testing</li><li>2.3.3 White-box Testing</li><li>2.3.4 Change-related Testing</li><li>2.3.5 Test Types and Test Levels</li></ul></li><li>2.4 Maintenance Testing<ul style="list-style-type: none"><li>2.4.1 Triggers for Maintenance</li><li>2.4.2 Impact Analysis for Maintenance</li></ul></li></ul>
<b>Unit - III</b>	<ul style="list-style-type: none"><li>3 Static Testing<ul style="list-style-type: none"><li>3.1 Static Testing Basics<ul style="list-style-type: none"><li>3.1.1 Work Products that Can Be Examined by Static Testing</li><li>3.1.2 Benefits of Static Testing</li><li>3.1.3 Differences between Static and Dynamic Testing</li></ul></li><li>3.2 Review Process<ul style="list-style-type: none"><li>3.2.1 Work Product Review Process</li><li>3.2.2 Roles and responsibilities in a formal review</li><li>3.2.3 Review Types</li><li>3.2.4 Applying Review Techniques</li><li>3.2.5 Success Factors for Reviews</li></ul></li></ul></li></ul>
<b>Unit - IV</b>	<ul style="list-style-type: none"><li>4 Test Techniques<ul style="list-style-type: none"><li>4.1 Categories of Test Techniques<ul style="list-style-type: none"><li>4.1.1 Choosing Test Techniques</li><li>4.1.2 Categories of Test Techniques and Their Characteristics</li></ul></li><li>4.2 Black-box Test Techniques<ul style="list-style-type: none"><li>4.2.1 Equivalence Partitioning</li><li>4.2.2 Boundary Value Analysis</li><li>4.2.3 Decision Table Testing</li><li>4.2.4 State Transition Testing</li><li>4.2.5 Use Case Testing</li></ul></li><li>4.3 White-box Test Techniques<ul style="list-style-type: none"><li>4.3.1 Statement Testing and Coverage</li><li>4.3.2 Decision Testing and Coverage</li><li>4.3.3 The Value of Statement and Decision Testing</li></ul></li></ul></li></ul>
<b>Unit - V</b>	<ul style="list-style-type: none"><li><b>Experience-based Test Techniques</b><ul style="list-style-type: none"><li>4.4.1 Error Guessing</li><li>4.4.2 Exploratory Testing</li><li>4.4.3 Checklist-based Testing</li></ul></li><li><b>Test Case</b><ul style="list-style-type: none"><li>What is Test Case? ,</li><li>How to write effect test case,</li><li>features of good test case,</li><li>Format for Manual Test Case Writing.</li><li>Case studies should be covered for Manual Test Case Writing.</li></ul></li></ul>

*Ashe*  
(ADC)

Co-ordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.

*Kwaghname*

VC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



<b>Text Books</b>	A. Software Engineering by R. Pressmen – 6th Ed B. Software Engineering by Sommerville C. Introducing Software Testing by Louise Tamres D. Effective Methods for software Testing by William Perry E. Software Testing in Real World by Edward Kit F. Software Testing Techniques by Boris Beizer  G. “Software Testing”, Srinivasan Desikan and Gopaldaswamy Ramesh - Pearson Education 2006
-------------------	---

*Ashe*  
(ADD-1)  
Co-ordinator

Modern College of Computer Science & I.T.,  
Aurangabad.

*Kweghmore*  
IC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.





Unit  
11


9. Software Engineering Concepts-Richard Fairley

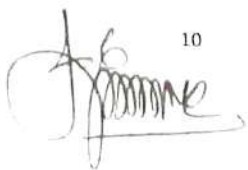
--- XXV ---

**B.C.A. VI<sup>th</sup> Semester Syllabus (CBCS)  
Paper No. XXXVI – Services Marketing (Elective )**

**Total : 100 Marks  
Theory : 80 Marks  
Sessional : 20 Marks**

		<b>No. of Lectures</b>
<b>Unit Introduction :</b>		<b>12</b>
I	Service Marketing, Concept, Nature of Services, Characteristics of Services, Classification of Services, Need and Importance of Service Marketing, objectives and Problems of Service Marketing, Difference between Goods and Service, Difference between Software Products and Software Services	
<b>Unit Marketing Communication :</b>		<b>12</b>
II	Meaning, Elements of marketing communication, Process of marketing communication – The Customer, The Business Environment and The Media, Role of Marketing Communication, Approaches in Marketing Communication - Corporate and Marketing oriented, Strategies in Marketing Communication – to match service promises with delivery, Key reasons for GAP4 involving communication	

  
**Co-ordinator**  
 Modern College of Computer Science & I.T.,  
 Aurangabad.



  
**VC Principal**  
 Modern College of Computer Science & I.T.  
 Aurangabad.



<b>Unit Promotion and Distribution of Services :</b>	<b>12</b>
III Promotion – Meaning and Concept, Objectives in Service marketing, Advertisements and Sales Promotion of Services, Distribution : Concept, Channels of Distribution, Obstacles in distribution, Recent Trends in distribution, Significance of Market Segmentation in Service Marketing	
<b>Unit Service Process and Performance:</b>	<b>12</b>
IV Service process – Concept, Steps in Service Process, 7 P's of Service Marketing Mix, Performance in Service Marketing – Concept, Monitoring of Marketing Performance, Triangle Model for Performance, Special Service Marketing Practices	
<b>Unit Techniques in Service Marketing:</b>	<b>12</b>
V B2B Strategies, GAP Model, PZB Model	

**Sessional Work : 20 Marks**

Two Tests : 10 Marks

Two Tutorials : 10 Marks

**References Books :**

1. Rampal & Gupta, "Service Marketing", Sultan Chand
2. Bhattacharjee, "Service Marketing", Excel Publisher
3. Zeithmal, "Service Marketing", Tata McGraw Hill, Third Edition
4. Govind Apte, "Service Marketing", Oxford University Press
5. Rama Mohana Raok, "Services Marketing", Pearson Education
6. Helen Woodruff, "Services Marketing",
7. Ardien Payne, "Essence of Services Marketing",
8. M.N. Mishra, "Sales Promotion & Advertising Management", Himalaya Publication
9. Dr. Niraj Kumar, "Marketing Communication", Himalaya Publishing House

— xxx —

**B.C.A. VI<sup>th</sup> Semester Syllabus (CBCS)  
Paper No. XXXVI – Export Management (Elective)**

**Theory – 80 Marks  
Sessional – 20 Marks**

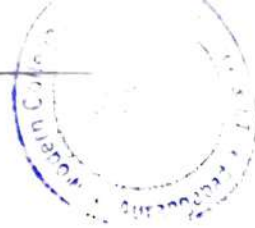
**Objective:**

- Students will be able to acquire the knowledge about Import Export Trade and Promotions in India

<b>Unit India's Foreign Trade:</b>	<b>No. of Lectures</b>
I <ul style="list-style-type: none"><li>• India's Foreign Trade &amp; Development</li><li>• Trends in India's foreign Trade</li><li>• Composition of Exports</li><li>• Major problems of Export Sector</li></ul>	<b>12</b>
<b>Unit Export Promotion in India:</b>	<b>12</b>

*Ashe*  
Coordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.

*Kwaghmare*  
VC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



II	<ul style="list-style-type: none"><li>• Evolution of Export Promotion Policies in India</li><li>• Regulatory Mechanism in Export Promotion</li><li>• Export Promotion Measures in India</li><li>• Obstacles faced in effective Export Promotion Effort</li></ul>	12
Unit III	<b>Institutional Framework for Export Promotion in India:</b> <ul style="list-style-type: none"><li>• Govt. policy making &amp; consultations</li><li>• Export Promotion Councils &amp; Commodity Boards</li><li>• Technical &amp; Specialised Services Assistances</li><li>• Govt. participation in foreign trade &amp; organisational setup in the states.</li><li>• Commercial wing of Indian Embassies Abroad</li></ul>	12
Unit IV	<b>Export Finance in India:</b> <ul style="list-style-type: none"><li>• Types of export finance</li><li>• Features of pre-shipment and post-shipment finance</li><li>• Methods of payment</li><li>• Role of commercial banks and EXIM bank in export finance</li></ul>	12
Unit V	<b>Common Export Documents, EPZ, EOU &amp; SEZ</b> <ul style="list-style-type: none"><li><b>A. Commercial Documents</b><ul style="list-style-type: none"><li>- Commercial Invoices</li><li>- Bill of lading</li><li>- Airway Bill</li><li>- Combined Transport Documents</li><li>- Insurance Certificate</li></ul></li><li><b>B. Statutory Documents</b><ul style="list-style-type: none"><li>- Documents for registration of firm</li><li>- Documents for shipping</li></ul></li><li><b>C. Export Processing Zones &amp; Export Oriented Units</b><ul style="list-style-type: none"><li>- Meaning &amp; objectives</li><li>- Major sectors</li><li>- Need for special license</li><li>- Benefits/facilities provided</li></ul></li><li><b>D. Special Economic Zones</b><ul style="list-style-type: none"><li>- Meaning &amp; objectives</li><li>- Criteria for setting up of SEZ</li><li>- Advantages of SEZ Units in India</li></ul></li></ul>	12

Sessional Work : 20 Marks

Two Tests : 10 Marks

Two Tutorials : 10 Marks

Reference Books :

1. Export Import Policy, Publisher: Ministry of Commerce, Government of India, New

  
**Co-ordinator**  
Modern College of Computer Science & I.T.,  
Aurangabad.

  
**VC Principal**  
Modern College of Computer Science & I.T.,  
Aurangabad.



- Delhi.
2. Export Management – Francis Cheruuilam – Himalaya Publishing House, Mumbai.
  3. Export Management – P. K. Khurana – Galgotia Publishing Company, New Delhi.
  4. Export Management – D. C. Kapoor – Vikas Publishing House Pvt. Ltd., New Delhi.
  5. International Marketing and Export Management – Pearson Publication, New Delhi.

— xxx —

13

Co-ordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.

I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

Syllabus  
2019-20

- 3 -

NAAC 'A' Accreditation

Dr. Babasaheb Ambedkar Marathwada University

Aurangabad-431004



**Revised Syllabus of  
B.Sc. First Year**

Computer Science- I & II Semester  
Three Year Degree Course  
(With Effective From: June 2014)



हे ज्ञानिची पवित्रता | ज्ञानीचि आथि ||

**Dr. Babasaheb Ambedkar Marathwada University**

Aurangabad-431004.

Tel.No. : 0240-2403400/431, Fax:0240-2403113

Website : [www.bamu.ac.in](http://www.bamu.ac.in), <http://bamua.digitaluniversity.ac.in>

*Kwajhman*

VC Principal

Modern College of Computer Science & I.T.,  
Aurangabad.



9.S-[F] S  
The De  
has p  
pres  
in  
T

**Dr. Babasaheb Ambedkar Marathwada University.**

**Appendix 'A'**

A Candidate shall be admitted to the I year of the B.Sc. (Computer Science) degree course only if he/she satisfies the following condition:

1. He/ She must have passed the higher secondary (multipurpose) examination conducted by H.S.C. board Government of Maharashtra with science / technical subjects Or an Examination of any statutory University and Board recognized as equivalent thereto.

OR

He/She must have passed examination prescribed at the end of second year of the junior college conducted by the H.S.C. board, Government of Maharashtra with English, Second language, Physics, Chemistry, Mathematics and or Biology or one of the technical subjects prescribed at the said examination as the optional or elective subjects or an examination recognized as equivalent thereto.

OR

Candidate having offered prescribed vocational course (MCVC) with Computer techniques/I.T./Electronics.

OR

Three years Diploma Course in engineering conducted by the board of technical Education, Maharashtra State.

2. He/ She must have passed at qualifying examination.

A candidate who has passed the B.Sc.(Computer Science) examination of this university may be allowed to present himself subsequently at the degree examination in a subject or subjects other than those he has taken earlier provided that he puts in three years of attendance as a regular candidate for First, Second and Third year in the subject or subjects concerned excluding compulsory English, Second Language and remaining optional subject(s).

A candidate shall not be allowed to appear for such examination if he has passed the higher examination.

*K. Jayaram*  
H.O. Principal

Modern College of Computer Science & I.T.,  
Aurangabad.



The Degree of Bachelor of Science (Computer Science) shall be conferred on candidate who has pursued a regular course of study consisting of six semesters in the relevant subject as prescribed and has appeared at the end examination and passed under the credit based system in all the examination prescribed for the Degree course in the faculty.

The pattern of the examination and the scope is indicated in the syllabus.[Annexure B]

The Number of students in a theory class shall not exceed 60.

Maximum number of students in a batch for practicals in first four semesters shall consist of 20 students and for fifth & sixth semester the batch shall consist of 15 students.

The rules for admission to the subsequent (next) semesters will be the same as per the University guidelines.

For Each course the concerned teacher will have to conduct Class tests after completion of 15 and 20 lectures. The mark list of the same is to be submitted to the university authority within 7 working days after the completion of class tests.

Final Examination will be conducted by the University based on the complete syllabus.

Final Practical Examination will be conducted by the university and examiners will submit the marks in the prescribed format of students for practical examination to the university.

**The Number of Teaching Staff & infra-structure required to run the course will be as follow:-**

The graduation is very important phase in the life of our young students. The college responsibly is not only to deliver a quality syllabus based education, but also to motivate them to be a good healthy citizen. In this direction, the college must have sufficient facilities to run the course. A guideline is listed below. The College must have following minimum facilities:

**Infrastructure:**

1. One Class room to accommodate 60 students. (approximately 250 sq.ft.)
2. A well equipped software Laboratory having a LAN system of 30 nodes and having internet connectivity with broad band. All legal software, antivirus software, firewall be available for smooth functioning of the laboratory.

*Kwayhmare*  
V/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad



S-[F] SU-02 June-2014-2015

Dr. Bah.

Curriculum c.  
Sr.

3. A hardware laboratory having twenty microprocessor kits with add on cards as per their syllabus. Staff room of 100 sq.ft. with one table and one Almeria for each faculty member.
4. One office space of 100 sq.ft. with appropriate furniture.
5. One lady room of 100 sq.ft. with attached toilet.
6. One reading room of 200 sq.ft. with seating arrangements for at least 30 people. The library may be accommodated in the library.
7. One copy of every text book among five students for each subject be available along with one copy of reference book as per the syllabus.
8. Library must subscribe for computer and scientific magazines. Appropriate general reading materials must be available for overall development of students.
9. An open space for sports activities. The college must be encouraged to have sport equipments.

**Staff:**

1. The head of the department in the scale of reader/Professor.
2. The minimum number of teachers must be appointed as per the work load. Per semester, the work load may be computed on the basis of theory classes, tutorials and practical class per batch. Minimum number of teachers to run the course must be five excluding the head. Teachers must be appointed by the university/UGC norms. The quality of the course is directly related to quality of teachers for the course.
3. There must be one clerk in the office to look after administrative work. The placement of all staffs must be maintained properly.
4. One qualified librarian  
An appropriate number of class IV employees.

*Kwajhmar*

I/C Principal

Modern College of Computer Science & I.T.,  
Aurangabad.





Dr. Babasaheb Ambedkar Marathwada University, Aurangabad



## Curriculum Structure and Scheme of Evaluation: B.Sc.(C.S.)

Sr. No.	Paper Number	Name of the Paper Titles	Scheme of Teaching	Scheme of Evaluation(Marks)		
			Theory / Practical (hrs / week)	Theory / Practical ( Marks )	Exam Duration ( in hrs.)	Total Marks
<b>I Semester</b>						
1	CS101-T	Computer Fundamentals	3	50	2	50
2	CS102-T	Digital Electronics	3	50	2	50
3	CS103-T	Microprocessor - I	3	50	2	50
4	CS104-T	C Programming - I	3	50	2	50
5	CS105-T	Communication Skill - I	3	50	2	50
6	CS106-T	Mathematical Foundation	3	50	2	50
7	CS107-P	Office Suite	4	50	2	50
8	CS108-P	Digital Electronics	4	50	2	50
9	CS109-P	Microprocessor - I	4	50	2	50
10	CS110-P	C Programming - I	4	50	2	50
<b>II Semester</b>						
1	CS201-T	Data Structure	3	50	2	50
2	CS202-T	Operating System	3	50	2	50
3	CS203-T	Microprocessor - II	3	50	2	50
4	CS204-T	C Programming - II	3	50	2	50
5	CS205-T	Communication Skill - II	3	50	2	50
6	CS206-T	Numerical Computation Methods	3	50	2	50
7	CS207-P	Data Structure	4	50	2	50
8	CS208-P	Microprocessor - II	4	50	2	50
9	CS209-P	C Programming - II	4	50	2	50
10	CS210-P	Numerical Computation Methods	4	50	2	50



### PATTERN OF QUESTION PAPERS

- Note : 1) All questions carry equal marks.  
2) All questions are compulsory.

Q. No.	Format	Marks
1.	Multiple Choice/Fill in the blank/Match the pair/ one line answer. 1) 2) : 10)	1 x 10 = 10
2.	a) b)  OR a)	5 * 2 = 10  10
3.	a) b)  OR a)	5 * 2 = 10  10
4.	a) b)  OR a)	5 * 2 = 10  10
5.	Write Short Notes On: (Any Two) a) b) c)	5 * 2 = 10
	Total	50

*Kavya*  
W/C Principal

Modern College of Computer Science & I.T.  
Autonomous

\* Not More than 3 bits should be asked in each question of 10 Marks.

(Only for Paper Setter)



*Kaajhmar*

9.S-[F] SU-02 June-2014-2015 All Syllabus Science Faculty B. Sc. Computer Science [Sem. I & II] Course : ...

- 10 -



9.S-[F] SU-02  
Paper - ...  
UNT



# B.Sc. (Computer Science) Semester I

**IIC Principal**  
Modern College of Computer Science & IT,  
Aurangabad.

9.S-[F] SU-02 June-2014-2015 All Syllabus Science Faculty B. Sc. Computer Science [Sem. I & II]

Course : B.Sc.(C.S.) I Sem.

Paper Title: Computer Fundamentals

Max. Marks : 50

Paper No. : CS101-T



#### UNIT - I

##### 1. Fundamentals of Computer System

- Characteristics & features of Computers.
- Components of Computers.
- Organization of Computer.

##### 2. Algorithm and Flowcharts

- Algorithm : Definition , Characteristics , Advantages and disadvantages , Examples
- Flowchart : Definition , Define symbols of flowchart , Advantages and disadvantages , Examples

##### 3. Computer Generation & Classification

- Generation of Computers : First to Fifth
- Classification of Computers : Distributed & Parallel computers

#### UNIT - II

##### 4. Computer Languages

- Types of Programming Languages : Machine Languages , Assembly Languages, High Level Languages
- Assembler, Linker, Loader, Interpreter & Compiler.

##### 5. Computer Memory

- Memory Cell & Organization
- Types of Memory (Primary And Secondary) : RAM , ROM , PROM , EPROM
- Secondary Storage Devices ( FD, CD, HD, Pendrive, DVD, Tape Drive, DAT )

##### 6. I/O Devices

- Input Devices : Touch screen , OMR, OBR , OCR, Light pen ,Scanners
- Output Devices: Digitizers, Plotters, LCD, Plasma Display, Printers

#### UNIT - III

##### 7. Processor

- Structure of Instruction , Description of Processor , Processor Features
- RISC & CISC

##### 8. Operating system Concepts

- Why Operating System?, Functions of Operating System , Booting of OS & it's type
- Types of Operating System : Batch O.S. , Multiprogramming O.S. , Time Sharing O.S. , Personal Computers O.S. , Network O.S.

#### Text Books:

1. Fundamentals of Information Technology; By Chetan Srivastava, Kalyani Publishers
2. Fundamentals of Computers: By V.Rajaraman, PHI Publication , IVth Edition.
3. Fundamentals of Programming: By Raj K.Jain, S.Chand Publication

#### Reference Books:

9.S-[F] SU-02 June-2014-2015 All Syllabus Science Faculty B. Sc. Computer Science [Sem.I & III]

I/C Principal

Modern College of Computer Science & I.T.,  
Aurangabad.



- Master slave FF

## 6. Counters

- Introduction : Asynchronous/ ripple counter
- Modulus Counter , MOD-12 counter
- Synchronous counter : Synchronous serial & synch parallel counter
- BCD counter
- Ring counter

## 7. Shift Registers

- Introduction, Buffer register
- Serial- in serial -out Serial-in parallel-out
- Parallel-in serial-out, parallel-in parallel-out

## Text Book:

1. Digital Electronics and Micro-Computers – R.K.Gaur , Dhanpat Rai Publication

## Reference Book:

1. Digital Electronics and Logic Design – N.G.Palan, Technova Publication





9.S-[F] SU-02 June-2014-2015 All Syllabus Science Faculty B. Sc. Computer Science [Sem.I & II]

- 14 -

9.S-[F] SU-02  
Paper Title :  
Course : B.Sc. Computer Science [Sem.I & II]  
UNIT - 1



Course : B.Sc.(C.S.) I Seme.

Paper Title: Micro processor - I

Max. Marks : 50

Paper No. : CS103-T



#### UNIT - I

##### 1. Introduction to Microprocessor and Microcomputer

- Historical background
- Microprocessor based personal computer system
- Computer data formats

##### 2. 8086 Hardware specification

- Microcomputer structure and operation
- 8086 internal architecture,
- Real Mode & Protected Mode Memory Addressing, Memory Paging.
- Introduction to programming 8086 : Prog.lang.

#### UNIT - II

##### 3. Addressing Modes

- Data addressing modes
- Program memory addressing modes
- Stack memory addressing modes

##### 4. Data Movement Instructions (Inst.related with 8086 only)

- MOV revisited: Machine language, the op-code, MOD field, register assignment, R/M memory addressing, special addr.mode

#### UNIT - III

##### 5. Data Movement Instructions (..)

- PUSH/POP, initializing stack.
- Miscellaneous data transfer instructions: XCHG, LAHF & SAHF

##### 6. Arithmetic instructions

- Addition, subtraction and comparison
- Multiplication and division
- BCD and ASCII arithmetic

#### Text Books:

1. The Intel Microprocessors: Architecture, programming and interfacing –  
By Barry B. Brey
2. Microprocessors and Interfacing : Douglas Hall.



*Kwaghmar*  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



9.S-[F] SU-02 June-2014-2015 All Syllabus Science Faculty B. Sc. Computer Science [Sem.I & II]

Course : B.Sc.(C.S.) I Seme.

Paper Title: 'C' Programming - I

- 16 -

Max. Marks : 50

Paper No. : CS104-T

#### UNIT - I

##### 1. Introduction :

- a. An Overview of C , History of C language, C as a Structured Language, Features of C.

##### 2. Basic Elements & Operators

- Character set, C Token, Identifier & Keywords, Variables
- Constant and its types. Integer constant, floating point constant, character constant, string constants.
- Operators: Arithmetic, Relational, Logical, Unary operators: Increment & decrement Assignment and Conditional operator.
- Precedence & Associativity of Operators

##### 3. Data Types

- Data Types: *int, char, float, double*. Declaration & Initialization.
- Type modifier: long, short, signed & unsigned

#### UNIT - II

##### 4. C Program & I/O statements

- Structure of C Program, Compilation & Execution of C program
- I/O: Introduction, Formatted Input/Output function: *scanf & printf*, Escape sequence characters.
- Library functions: General & Maths.

##### 5. Control and Iterative Statements :

- Simple if, nested if, if-else, else if ladder
- Switch-case statement
- The conditional expression (? : operator)
- *while* and *do-while* loop, and *for* loop
- *break & continue* statement, *goto* statement

#### UNIT - III

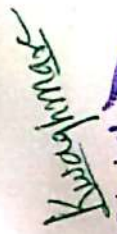
##### 6. Arrays:

- Introduction, Declaration and initialization Accessing array elements, Memory representation of array.
- One dimension and multidimensional arrays, character array, Introduction to string.

##### Text Books::

1. Let us C : Y.P. Kanetkar [bpb publication]
2. Programming in C : E. Balaburuswamy [Tata macgraw hill]
3. Programming in C : Goterfried [Shaums' Series]

##### Reference Books:

  
Principal  
Modern College of Computer Science & I.T.



- 17 -

1. Spirit of "C" : Moolish Kooper.

Course : B.Sc.(C.S.) I Seme.

Max. Marks : 50

Paper Title: Communication Skill- I

Paper No. : CS105-T

#### UNIT - I

1. **Introduction to Communication**  
Importance of Communication, Definition of Communication  
Elements of Communication, Communication process
2. **Types of Communication**  
Upward Communication, Downward Communication  
Horizontal Communication
3. **Method of Communication** : Verbal , Oral , Written

#### UNIT - II

4. **Written Communication**  
Punctuation marks.  
Grammar: Parts of Speech, tenses,  
vocabulary building, constructing para.  
'C's of good communication  
Language of business writing

#### 5. Oral Communication

Speeches and Presentation  
Dialogues

#### UNIT - III ( English Language Lab )

#### 6. Listening Comprehension

Listening and typing – Listening and sequencing  
of sentences .

#### 7. Reading Comprehension and Vocabulary

Filling in the blanks - Cloze Exercises –  
Vocabulary building –  
Reading and answering questions.

#### 8. Speaking

- a. Phonetics: Intonation – Ear Training – Correct  
Pronunciation – Sound recognition exercises -  
Common Errors in English
- b. Conversations: Face to Face Conversation -  
Telephone conversation –

#### Text Books

1. Business Communication , By urmila Rai & S.M.Rai. Himalaya Pub.

*Kalyan Kumar*  
IIC Principal

2. Communication Skill for Effective Management By Dr.Anjali Ghanekar. Everest Pub. House.

3. Developing Communication Skill By Krishna Mohan, Meera Banerji. McMillan

Course : B.Sc.(C.S.) I Semc.

Paper Title: Mathematical Foundation

Max. Marks : 50

Paper No. : CS106-T

UNIT - I

1. Set Theory-

- **Basic Definitions:** Set, Finite set, Infinite set, Singleton Set, Empty set, Subset, Proper Subset, Universal set, Power set, Venn diagram ,
- **Operations on set:** Union of sets, Intersection of Sets, Complement of a set, Equality of two sets, Disjoint sets, Difference of two sets, Symmetric Difference, Cartesian Product; explanation of each using Venn-diagram and simple examples. Principle of Inclusion and Exclusion.
- **Algebraic Properties of Set:** Statement and proof of Commutative Laws, Associative Laws, Distributive Laws, Idempotent Laws, Properties of Complement, Principle of Duality.

UNIT - II

2. Graph Theory:

- **Introduction:** Graph Definition & Terminologies, Application of Graph, Finite & Infinite Graphs, Incidence and Degree, Isolated Vertex, Pendant Vertex and Null Graph.
- **Matrix Representation of Graph:** Incidence & Adjacency Matrix.
- **Path & Circuits:** Isomorphism, Subgraphs, Walks, Paths and Circuits, Connected Graphs, Disconnected Graphs and Components, Euler Graphs.
- **Operations on Graph:** Union, Intersection & Ring Sum.
- **Directed Graph :** Definition, Types of Directed Graph, Directed Path & Connectedness.

UNIT - III

3. Relation and Function

- **Introduction:** Binary Relation, Tabular Form, Graphical Form, Ternary Relation, Quaternary Relation.
- **Properties of Binary Relations:** Reflexive Relation, Symmetric Relation, Antisymmetric Relation, Transitive Relation, Equivalence Relation.
- **Function :** Introduction, Function Mapping, Types of Functions: 1:1 , 1:M

4. Boolean Algebra

- Finite Boolean Algebra, Boolean Expression, Boolean Function.
- Disjunctive Normal Form & Simplification.

*Kumar*



**Text Books:**

1. "Discrete Mathematical Structures" by Bernard Kolman, Robert C. Busby, Sharon Cutler Ross, Pearson Education Asia.
2. "Elements of Discrete Mathematics" by C.L. Liu, Tata McGraw-Hill
3. "Discrete Mathematics" by Dr. Bembalkar.
4. "Graph Theory" by Narsingh Deo

**Course : B.Sc.(C.S.) I Seme.**

**Max. Marks : 50**

**Paper Title: Office Suite**

**Paper No. : CS107-P**

- **GUI Operating System** : Mouse Practice, Starting, Login, Shutdown, Exploring Directories, Resizing, Moving, Minimizing, closing of software windows, familiarization with file icons, Launching Applications, Deleting, Renaming files, Managing Directories, Searching for files, Using Accessories.
- **Web Browser:** Basic Browsing, Buttons: forward, backward, home, adding to favorites, stop, save, save as, Saving an Image from the Web, printing, Specifying a Home Page, **Browsing:** Using Web URLs, Anatomy of a URL, Membership Websites: Signing up for email service, **Searching:** Academic Search on the web.
- **Word Processing Tool:** Menus, Shortcut menus, Toolbars, Customizing toolbars, Creating and opening documents, Saving documents, Renaming documents, Working on multiple documents, Close a document ; **Working With Text** :Typing and inserting text, Selecting text, Deleting text, Undo, Formatting toolbar, Format Painter, Formatting Paragraphs: Paragraph attributes, Moving, copying, and pasting text, The clipboard, Columns, Drop caps; **Styles** : Apply a style, Apply a style from the style dialog box, Create a new styles from a model, Create a simple style from the style dialog box, Modify or rename a style, Delete a style; **Lists** : Bulleted and numbered lists, Nested lists, Formatting lists **Tables** :Insert Table button, Draw a table, Inserting rows and columns, Moving and resizing a table, Tables and Borders toolbar, Table properties **Graphics** :Adding clip art, Add an image from a file, Editing a graphic, AutoShapes; **Spelling and Grammar:** AutoCorrect, Spelling and grammar check, Synonyms, Thesaurus; **Page Formatting:** Page margins, Page size and orientation, Headers and footers, Page numbers, Print preview and printing.

*Kunzghmax*

IIC Principal

Modern College of Computer Science & I.T.,  
Aurangabad.



- **Spreadsheet Basics:** Screen elements, Adding and renaming worksheets, The standard toolbar - opening, closing, saving, and more; **Modifying A Worksheet,** Moving through cells, Adding worksheets, rows, and columns, Resizing rows and columns, Selecting cells, Moving and copying cells,, Freeze panes; **Formatting Cells:** Formatting toolbar, Format Cells dialog box, Dates and times; **Formulas and Functions:** Formulas, Linking worksheets, Relative, absolute, and mixed referencing, Basic functions, Function Wizard, Autosum, **Sorting and Filling:** Basic ascending and descending sorts, Complex sorts, Autofill; Alternating text and numbers with Autofill, Autofilling functions; Graphics; Adding clip art; Add an image from a file; Editing a graphics; AutoShapes; **Charts:** Chart Wizard; Resizing a chart; Moving a chart, Chart formatting toolbar; **Page Properties and Printing:** Page breaks, Page orientation, Margins, Headers, footers, and page numbers, Print Preview, Print; Keyboard Shortcuts.
- **Presentation Tool:** AutoContent Wizard, Create a presentation from a template, Create a blank presentation, Open an existing presentation, AutoLayout, Presentation Screen: Screen layout, Views, Working with Slides: Insert a new slide, Applying a design template, Changing slide layouts, Reordering slides, Hide slides, Create a custom slide show, Edit a custom slide show **Adding Content:** Resizing a text box, Text box properties, Delete a text box, Bulleted lists, Numbered lists, Adding notes, Video and Audio Working with Text: Adding text, Editing options, Formatting text, Replace fonts, Line spacing, Change case Spelling check **Color & Background:** Color schemes, Backgrounds, Graphics, Adding clip art, Adding an image from a file, Editing a graphic, AutoShapes, WordArt **Slide Effects:** Action buttons, Slide animation, Animation preview, Slide transitions, Slide show options, Master Slides, Slide master, Header and footer, Slide numbers, Date and time Saving and Printing, Save as a web page, Page setup, Print
- **Integrating Programs** Word, spreadsheet and Presentation.

**Note:**

**The above practical is to be conducted using the either Microsoft-Office or OpenOffice.**

*K. Anwar*  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

Course : B.Sc.(C.S.) I Seme.

Paper Title: Digital Electronics

Max. Marks : 50

Paper No. : CS108-P



**Instruction:** The Laboratory work will have to be performed during the semester consisting of any of the 8 experiments from the given list below:

**List of Experiments:**

1. Study and Testing of measuring instruments: Digital and Analog multimeters, CROs and Signal Generators – measurement of AC & DC voltages, measurement of frequency.
2. Study of Components: Identification and testing of resistors, capacitors, inductors, diodes, LEDs & transistors
3. Study of Logic Gates: Study of truth table of basic gates, realization of Boolean functions
4. Study of Half adder and Full Adder
5. Study of Half Subtractor and Full Subtractor
6. Study of Implementation of a 3:8 decoder,
7. Study of 4-line to 16 bit decoder
8. Study of BCD to 7-segment decoder
9. Study of Generating a Boolean expression with a multiplexer
10. Study of Clocked JK Flip Flop
11. Study of 4-bit ripple counter
12. Study of Parallel-in, serial-out, 4-bit shift register



**Course :** B.Sc.(C.S.) I Seme.

**Max. Marks :** 50

**Paper Title:** Micro Processor - I

**Paper No. :** CS109-P

**List of Experiments:**

1. Addition and subtraction of two 8-bit numbers with programs based on different Addressing modes of 8086.
2. Addition and subtraction of two 16-bit numbers. (Using 2's complement method, also programs which access numbers from specified memory locations)
3. Multiplication of two 8-bit numbers using the method of successive addition and Shift & add.
4. Division of two 8-bit numbers using the method of successive subtraction and shift & subtract.
5. Block transfer and block exchange of data bytes.

**Course :** B.Sc.(C.S.) I Seme.

**Max. Marks :** 50

**Paper Title:** 'C' Programming

**Paper No. :** CS110-P

**List of Experiments:**

1. Find Area, Perimeter of Triangle & Rectangle.
2. Find maximum amongst 3 numbers.
3. Program for nested loops.
4. Program to Calculate  $x^y$
5. Program to check Prime Number, Program reverse of digit.
6. Program to find Armstrong Number.
7. Program to print the Fibonacci Series
8. Searching and element from array.
9. Transpose of matrices
10. Multiplication of matrices
11. Sorting array using bubble sort technique
12. Program for factorial.

**Note :** Any other five program of faculty's interest.

Co-ordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.

*K. Srinivas*

Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.





## B.Sc. (Computer Science) Semester II

*Kwaghmare*

IIC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

Course : B.Sc.(C.S.) II Seme.

Paper Title: Data Structure

UNIT – I

Max. Marks : 50

Paper No. : CS201-7

### 1. Introduction to Data Structure:

- Basic Terminology : Data item, Fields, Records, Files, Entity, Attributes
- Data Organization and Data Structure

### 2. Arrays

- Representation of Linear Arrays
- Traversing, Insertion and Deletions
- Sorting & Searching Algorithms
- Multidimensional Arrays : 2D & M-D Concept
- Record: Record Structures, Representation in Memory

UNIT – II

### 3. Linked List

- Concept of Linked List
- Representation of linked List in memory
- Traversing a linked list
- Searching a linked list : sorted and unsorted
- Insertion & Deletion in Linked List
- Header Linked List & Two way List

UNIT – III

### 4. Stacks, Queues , Recursion

- Stack: Operation , Array Representation of Stack, linked representation of stack, Arithmetic Expression POLISH & POSTFIX,
- Application of stacks: Quicksort, Recursion.
- Queue: Representation of queues & link.
- Types of Queues : Deques & Priority Queues

Text Books:

1. Data Structures : By Seymour Lipschutz, Tata Mcgraw- Hill Publication.

Reference Books:

1. Fundamentals of Data structures, by Horowitz & Sahani (Prentice hall pub).



2. An introduction to data structures and application, by Jean Paul & Pal G. Sorenson (McGraw Hill).
3. Data Structures, by Tannenbaum, (PHI).

Course : B.Sc.(C.S.) II Seme.

Paper Title: Operating System

Max. Marks : 50

Paper No. : CS202-T

#### UNIT – I

##### 1. Process Management

- **Concept of Process:** Process State, Operation on Processes, thread.
- **CPU Scheduling :** Types of Schedulers, Criteria for scheduling, Scheduling Algorithms.
- **Process Synchronization:** Need for synchronization, Critical Section, Hardware Synchronization, Semaphores, Monitors, Problem of synchronization.
- **Deadlocks:** Concept of Deadlock, Deadlock Modeling, Methods for Handling Deadlock

#### UNIT – II

##### 2. Storage Management

- **Memory Management:** Address Binding, Logical Vs. Physical Address space, Memory Allocation, Paging, Segmentation, Segmentation and paging of Intel Pentium.
- **Virtual Memory:** Demand Paging, Page replacement Algorithms (FIFO, Optimal, LRU), Virtual Memory in windowsXp.
- **File System Interface:** Files, File Access, Directory Structure, Protection.
- **Implementation of File System:** Allocation Methods, Free space Management

#### UNIT – III

##### 3. Device Management

- **Introduction :** Dedicated Devices, Shared Device & Virtual Device
- **Device Characteristics:** Input and Output devices , Storage devices , Device allocations
- **Concept of I/O Traffic Controller:** I/O Scheduler, introduction to Virtual Devices.

##### 4. Information Management

- Concept of File system
- Symbolic file system
- Access control verification
- Logical and physical file system

#### Text Books:

1. "Operating System", By S.R.Sathe & Anil S.Mokhade , MacMillan Publication.
2. "Operating System", By Stuart E.Madnick, John J.Donovan.

*K. K. Kulkarni*



9.S-[F] SU-02 June-2014-2015 All Syllabus Science Faculty B. Sc. Computer Science [Sem.I & II]  
Course: I.T. Paper: I

- 26 -

### Reference Books:

1. Operating System Concepts- A. Silberchaz & P.B. Galvin, Addison - Wesley Publishing Comp

*Kavya Wankar*

H/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

Course : B.Sc.(C.S.) II Seme.

Max. Marks : 50

Paper Title: Micro Processor - II

Paper No. : CS203-T



**UNIT - I**

**1. 8086 Microprocessor: Logic instructions**

- Basic logic Instructions: AND, OR, Exclusive-OR, NOT, NEG
- Shift and rotate

**2. Program control Instructions**

- The JUMP group Instruction: Conditional & Un-Conditional.
- Procedures - CALL & RET
- Controlling the Flow of an Assembly Language Program
  - Loops - WHILE, REPEAT UNTIL
- Machine Control & Miscellaneous Instruction : WAIT, NOP, HALT, LOCK, ESC, ENTER, BOUND, LEAVE

**UNIT - II**

**3. Programming the Microprocessor**

- String Procedure & Macros
- Modular Programming – Assembler & linkers.
- Instructions – AAA, AAD, AAM, AAS, ADC, ADD, SUB, MOV, DAA, DEC, DIV, ESC, HALT, INT, INC, INTO, JNZ, JZ, JMP, LOOP, LOOPZ, MUL, MOVS, POP, PUSH, RET, ROR, SBB, WAIT, XCHG.

**UNIT - III**

**4. Interrupts**

- Basic Interrupt Processing, Hardware Interrupts, 8259 A Programmable interrupt Controller, Interrupt Examples.

**5. DMA & DMA Control I/O**

- Basic DMA Operation, 8237 DMA Controller, Shared Bus Operation, Disk Memory Systems, Video Displays.

**Text Books:**

1. The Intel Microprocessors: Architecture, programming and interfacing -

By Barry B. Brey



9.S-[F] SU-02 June-2014-2015 All Syllabus Science Faculty B. Sc. Computer Science [Sem.I & II]

- 28 -

2. Microprocessors and Interfacing : Douglas Hall.

*Kushnagar*  
H/O Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

9.S-[F] SU-02 June-2014-2015 All Syllabus Science Faculty B. Sc. Computer Science [Sem.I & II]

Course : B.Sc.(C.S.) II Seme.

Max. Marks : 50

Paper Title: 'C' Programming – II

Paper No. : CS204.T



## UNIT – I

### 1. Functions

- Introduction, types of functions. Defining functions, Arguments, Function prototype, actual parameters and formal parameters, Calling function, Returning function results, Call by value, Recursion.

### 2. Structure & Union

- Structure: Introduction, Declaration and initializing structure, Accessing structure members, Nested structures, Arrays of structure, *typedef* statement.
- Unions: Declaration, Difference between structure and union

## UNIT – II

### 3. Pointers:

- Introduction, Memory organization. Declaration and initialization of pointers. The pointer operator \* and &, De-referencing, Pointer expression and pointer arithmetic, Pointer to pointer.

### 4. Storage Class & Library Functions:

- Storage classes, Scope, visibility and lifetime of variable, block and file scope, auto, extern, static and register storage classes.
- **String handling functions:** strcpy(), strcmp(), strcat(), strlen(),strupr(), strlwr(), gets(), puts()
- **Data conversion functions from stdlib.h:** atoi(), atol(), atof(), itoa(), ltoa(), random(), calloc(), malloc(), exit(), abs(), toupper(), tolower()

### 5. Preprocessor Directives:

- File inclusion and conditional compiler directives, Macro substitution, #define, #if, #ifdef, #else, #elif, #endif,

### 6. Miscellaneous Features:

- Bitwise Operators: Introduction, Masking, Internal representation of data, Bit fields, Enumerated data types, Type casting.

## UNIT – III

### 7. File Handling

- **File handling:** Introduction, Opening & closing a file, Input/Output operations on files, text and binary files, getc(), putc() function. File



copy program, fprintf() and fscanf(). fread() and fwrite() function,  
Writing and reading records from binary file, Appending, modifying and  
deleting a record from file, Random access functions fseek(), rewind(),  
flushall(), remove(), rename().

**Text Books:**

- |                       |                    |                     |
|-----------------------|--------------------|---------------------|
| 1. Let us C Solutions | : Y.P. Kanetkar    | [bbp publication]   |
| 2. Programming in C   | : E. Balagurusamy. | [Tata macgraw hill] |
| 3. Programming in C   | : Goterfried       | [Shaums Series]     |

**References Books:**

- |                          |                   |
|--------------------------|-------------------|
| 1. Spirit of "C"         | : Moolish Kooper. |
| 2. Test your Skills in C | : Y.Kanetkar      |

*Kishor Kumar*

IICP Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



Course : B.Sc.(C.S.) II Seme.

Paper Title: Communication Skill-II

Max. Marks : 50

Paper No. : CS205-T



#### UNIT - I

##### 1. Communication with Media

- Written media of Communication: Letters, Notices, Minutes, Manual, Leaflets, Complaints & Suggestion, Job Application.
- Visual Media of communication: slide presentation, Pictures & Photographs, Posters & Advertisement.
- Non-Verbal Media of Communication

##### 2. Written Communication: Reports

- Types of Report, characteristics of Good Report , Essential Requisites of Good Report-Writing, Planning the Report, Outlining Issues for Analysis, Writing the Reports.

#### UNIT - II

##### 3. Group Communication

- Problem of Group Communication- Meeting - types of meeting, Advantages & Disadvantages of Meeting, - Preparation for Meeting – conduct of a Meeting – Responsibility of participants.

##### 4. Interview

- Purpose, Types of interviews – promotion, appraisal, exit, telephone.
- Employment or selection Interview : Candidate's preparation, Question commonly asked in interview, role of interviewer, Interviewer's preparation.

#### UNIT - III

##### 5. Listening Comprehension

- Cassettes: "Tiger's Eye" Series.( vol. 1 & 2) , "Twist in the Tail"
- The Listening drill is to be given and question should be framed.

##### 6. Reading Comprehension and Vocabulary

- Reading with proper pronunciation and ideal reading is to be recorded.

##### 7. Speaking:

- CIEFL' Spoken English exercises part one and two.
- Drilling : Proper Pronunciation of word and sentences

#### Core Books

1. Business Communication, By urmila Rai & S.M.Rai. Himalaya Pub.(Tenth Ed.)
2. Communication Skill for Effective Management By Dr.Anjali Ghanekar. Everest Pub. House.

Note : 1. Teacher should demonstrate various format of concerned contents.

2. For Report writing practice demonstrate IEEE paper Format.( [http://www.ieee.org/portal/cms\\_docs/pubs/pubs\\_center/pdfs/samplems.pdf](http://www.ieee.org/portal/cms_docs/pubs/pubs_center/pdfs/samplems.pdf) ,

*Kusumax*  
H.C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



9.S-[F] SU-02 June-2014-2015 All Syllabus Science Faculty B. Sc. Computer Science [Sem.I & II]

- 32 -

[http://www.ieee.org/portal/cms\\_docs\\_iportals/iportals/publications/journmag/transactions/TRANS-JOUR.doc](http://www.ieee.org/portal/cms_docs_iportals/iportals/publications/journmag/transactions/TRANS-JOUR.doc)

*Krushnam*

H/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

9.S-[F] SU-02 June-2014-2015 All Syllabus Science Faculty B. Sc. Computer Science [Sem.I & II]



Course : B.Sc.(C.S.) II Seme.

Max. Marks : 50

Paper Title: Numerical Computation Methods

Paper No. : CS206-T



#### UNIT - I

1. **Introduction**
  - Mathematical Modeling, Characteristics, Error in Calculation
  - Significant Error , Absolute, Percentage Relative Error
  - Chopping off and Rounding off Error.
  - Truncation Error, Propagation Error.

#### 2. Matrices and Determinants.

- Definitions, Matrix Operations
- Determinant of Square Matrix, Cofactor
- Adjoint of Matrix, Rank of Matrix

#### 3. Numerical Solutions of Transcendental Equations

- Concept of Iterative Methods, Search Method for Initial Guess.
- Bisection Method
- False Position Method
- Newton-Raphson Method

#### UNIT - II

#### 4. Elimination Methods for Solving Simultaneous Equations

- Introduction and Matrix Notation of set of Equations
- Gauss Elimination Method
- Gauss Seidal Method
- Matrix Inversion Method

#### 5. Interpolation

- Introduction and Polynomial Interpolation
- Newton-Gregory Forward Difference Interpolation Formula
- Newton-Gregory Backward Difference Interpolation Formula

#### UNIT - III

#### 6. Interpolation - II

- Newton's divided Difference Interpolation
- Lagrange's Interpolation

#### 7. Least Square Curve Fitting

- Best Fit and Criteria for Best Fit and Least Square Fit.
- Linear Regression.

#### Text Books:

1. "Numerical Computational Methods" - Dr. P.B.Patil, Narosa Publication Hous.

#### Reference Books:

1. Numerical methods -S.C.Chapra, R.P.Canale-McGraw Hill
2. Numerical methods-E.Bulguruswamy

*Kavayathirakshana*



9.S-[F] SU-02 June-2014-2015 All Syllabus Science Faculty B. Sc. Computer Science [Sem.I & II]

- 34 -

*Kwajimax*  
H/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

9.S-[F] SU-02 June-2014-2015 All Syllabus Science Faculty B. Sc. Computer Science [Sem.I & II]



Course : B.Sc.(C.S.) II Seme.  
Paper Title: Data Structure

Max. Marks : 50

Paper No. : CS207-P



**Assignments: Write the Program using C (if applicable) :**

**Data Structure:**

1. Write a program using DIV(J,K) which reads a positive integer  $N > 10$  and determines whether or not  $N$  is a prime number.
2. Write a program which counts the number of particular character/word in the String.
3. Write a program which reads words WORD1 and WORD2 and then replaces each occurrence of word1 in text by word2
4. Write the programs for traversing of  $n$  item using the array.
5. Write the programs for insertion and deletion of  $n$  item using the array.
6. Implement Linear and binary search algorithm using C.
7. Implement Bubble sort using C.
8. Write the programs for traversing of  $n$  item from the linked list.
9. Write the programs for push and pop operation using the stacks.
10. Write the programs for insertion and deletion of  $n$  item from the queues.



**Course : B.Sc.(C.S.) II Seme.**

**Paper Title: Micro Processor - II**

**Max. Marks : 50**

**Paper No. : CS208-P**

Any ten experiments from the list given below:

1. Addition and subtraction of two 8-bit numbers with programs based on different Addressing modes of 8086.
2. Addition and subtraction of two 16-bit numbers. (Using 2's complement method, also programs which access numbers from specified memory locations)
3. Multiplication of two 8-bit numbers using the method of successive addition and Shift & add.
4. Division of two 8-bit numbers using the method of successive subtraction and shift & subtract.
5. Block transfer and block exchange of data bytes.
6. Finding the smallest and largest element in a block of data.
7. Arranging the elements of a block of data in ascending and descending order.
8. Generating delays of different time intervals using delay subroutines and measurement of delay period on CRO using SOD pin of 8086.
9. Program for Summation of First n Number.
10. Program for Factorial of n.
11. Program for Addition of Array elements.
12. Program for Reversing the Array elements

*Kavayam*

Principal

Modern College of Computer Science & I.T.,  
Aurangabad.





9.S-[F] SU-02 June-2014-2015 All Syllabus Science Faculty B. Sc. Computer Science [Sem.I & II]

- 38 -

Course : B.Sc.(C.S.) II Seme.

Max. Marks : 50

Paper Title: Numerical Computational Method


Paper No. : CS210-P

1. Program in C for representation of, Bisection Method
2. Program in C for representation of, False Position Method
3. Program in C for representation of, Newton-Raphson Method
4. Program in C for representation of, Gauss Elimination Method
5. Program in C for representation of, Matrix Inverse Method
6. Program in C for representation of, Newton-Gregory Forward Difference Interpolation Formula
7. Program in C for representation of, Newton-Gregory Backward Difference Interpolation Formula
8. Program in C for representation of Newton's divided Difference Interpolation
9. Program in C for representation of Lagrange's Interpolation

S\*/-020614/-

-\*\*=-

  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

  
Co-ordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.







S-30th May, 2015 AC after Circulars from Circular No.1 &amp; onwards - 6 -

**DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY****CIRCULAR NO.ACAD/SU/Sci./B.Sc. & M.Sc. Syll./5/2015**

It is hereby notified for information to all the concerned that, on the recommendation of the Faculty of Science the Academic Council at its meeting held on 30-05-2015 has accepted the revised semester-wise syllabi as mentioned against their names in the Faculty of Science as under :-

Sr. No.	Name of the Subject	Semester
✓[1]	B.Sc. Computer Science Degree Course	III & IV
[2]	B.Sc. Information Technology Degree Course	III & IV
[3]	B.C.A. Science Degree Course	III & IV
[4]	B.Sc. Animation Degree Course	III & IV
[5]	B.Sc. Bioinformatics Degree Course	III & IV
[6]	B.Sc. Computer Science [Optional]	III & IV
[7]	B.Sc. Information Technology [Optional]	III & IV
[8]	B.Sc. Computer Applications [Optional]	III & IV
[9]	B.Sc. Computer Maintenance [Optional]	III & IV
[10]	B.Sc. Environmental Science [Optional]	V & VI
[11]	B.Sc. Bio-Chemistry [Optional]	V & VI
[12]	B.Sc. Forensic Science Degree Course	V & VI
[13]	B.Sc. Industrial Chemistry [Optional]	V & VI
[14]	B.Sc. Electronics [Optional]	V & VI
[15]	B.Sc. Zoology [Optional]	V & VI
[16]	B.Sc. Microbiology [Optional]	V & VI
[17]	B.Sc. Instrumentation Practice [Optional]	V & VI
[18]	B.Sc. Statistics [Optional]	V & VI
[19]	B.A. Statistics [Optional]	V & VI
[20]	B.A. / B.Sc. Mathematics [Optional]	V & VI
[21]	B.Sc. Home Science Degree Course	V & VI
[22]	B.Sc. Textile Interior Decoration Degree Course	V & VI
[23]	B.Sc. Fishery Science [Optional]	V & VI
[24]	B.Sc. Dairy Science & Technology [Optional]	V & VI
[25]	B.Sc. Botany [Optional]	V & VI
[26]	B.Sc. Physics [Optional]	V & VI
[27]	M.Sc. Computer Science	III & IV
[28]	M.Sc. I.T.	III & IV

This is effective from the Academic Year 2015-16 & onwards as appended herewith.

All concerned are requested to note the contents of the circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,  
Aurangabad-431 004.  
REF.NO.ACAD/SU/Sci./  
2015/3761-4160  
Date:- 16-06-2015.

★  
★  
★  
★  
★  
\*\*\*\*\*

*AG*  
**Director,**  
**Board of College and**  
**University Development.**

*MC Principal*  
*2...*  
Modern College of Computer Science & I.T.,  
Aurangabad.



B.Sc.Comp.Sci. IInd Yr. Sem.III & IV - 2 -

S-30th May, 2015 AC after Circulars from Circular No.1 & onwards

- 7 -

:: 2 ::

**Copy forwarded with compliments to:-**

- 1] The Principals, affiliated concerned colleges,  
Dr. Babasaheb Ambedkar Marathwada University

**Copy to :-**

- 1] The Controller of Examinations,
- 2] The Director, [E-Suvidha Kendra], in-front of Registrar's Quarter,  
Dr. Babasaheb Ambedkar Marathwada University,
- 3] The Superintendent, [B.Sc. Unit],
- 4] The Superintendent, [M.Sc. Unit],
- 5] The Programmer [Computer Unit-1] Examinations,
- 6] The Programmer [Computer Unit-2] Examinations,
- 7] The Record Keeper.

B\*/-160615/-

.....

*Kwaghmare*

I/C Principal

Modern College of Computer Science & I.T.,  
Aurangabad.





# B.Sc. (Computer Science)

## Semester -III & IV

Three year Degree Course

(effective from 2015-16)

*Kwayhmar*

IC Principal

Modern College of Computer Science & I.T.,  
Aurangabad.



Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

Curriculum Structure and Scheme of Evaluation: B.Sc.(C.S.)

Sr. No.	Paper Number	Name of the Paper Titles	Scheme of Teaching		Scheme of Evaluation (Marks)		Total Marks
			Theory / Practical (Lect./week)	Theory / Practical (Marks)	Exam Duration (in hrs.)	Total Marks	
<b>I Semester</b>							
1	CS101-T	Computer Fundamentals	3	50	2	50	50
2	CS102-T	Digital Electronics	3	50	2	50	50
3	CS103-T	Microprocessor - I	3	50	2	50	50
4	CS104-T	C Programming - I	3	50	2	50	50
5	CS105-T	Communication Skill - I	3	50	2	50	50
6	CS106-T	Mathematical Foundation	3	50	2	50	50
7	CS107-P	Office Suite	3	50	2	50	50
8		C Programming - I	4	50	2	50	50
9	CS108-P	Microprocessor - I	4	50	2	50	50
10		Digital Electronics	4	50	2	50	50
<b>II Semester</b>							
1	CS201-T	Data Structure	3	50	2	50	50
2	CS202-T	Operating System	3	50	2	50	50
3	CS203-T	Microprocessor - II	3	50	2	50	50
4	CS204-T	C Programming - II	3	50	2	50	50
5	CS205-T	Communication Skill - II	3	50	2	50	50
6	CS206-T	Numerical Computation Methods	3	50	2	50	50
7	CS207-P	Data Structure	4	50	2	50	50
8		Microprocessor - II	4	50	2	50	50
9	CS208-P	C Programming - II	4	50	2	50	50
10		Numerical Comp. Methods	4	50	2	50	50

*Yashwantrao*  
 IIC Principal  
 Modern College of Computer Science & I.T.  
 Page 1 | Page



Sr. No.	Paper Number	Name of the Paper Titles	Scheme of Teaching		Scheme of Evaluation (Marks)		Total Marks
			Theory / Practical (Lect. / week)	Theory / Practical (Marks)	Exam Duration (in hrs.)		
<b>III Semester</b>							
1	CS301-T	Advance Data Structure	3	50	2	50	50
2	CS302-T	Unix Operating System	3	50	2	50	50
3	CS303-T	PC Maintenance	3	50	2	50	50
4	CS304-T	Programming in CPP	3	50	2	50	50
5	CS305-T	Database Management System	3	50	2	50	50
6	CS306-T	Statistical Method	3	50	2	50	50
7	CS307-P	Data Structure using CPP	4	100	2	100	100
8		DBMS	4		2		
9	CS308-P	PC Maintenance	4	100	2	100	100
10		Unix	4		2		

<b>IV Semester</b>							
1	CS401-T	Software Engg.	3	50	2	50	50
2	CS402-T	Fedora	3	50	2	50	50
3	CS403-T	Basic of Networking	3	50	2	50	50
4	CS404-T	Core Java	3	50	2	50	50
5	CS405-T	Adv. DBMS	3	50	2	50	50
6	CS406-T	Web Fundamental	3	50	2	50	50
7	CS407-P	Java in Fedora OS	4	100	2	100	100
8		Web Funda	4		2		
9	CS408-P	Based in Adv. DBMS and N/w	4	100	2	100	100
10		Mini Project	4		2		

  
**IIC Principal**  
 Modern College of Computer Science & I.T.,  
 Aurangabad.



Course: B.Sc.(C.S.)

Semester : III

Topic: Advanced Data Structure

Paper No.: CS301-T

- 1 Unit - I Binary Trees  
Representing Binary, Trees in Memory, Traversing Binary Trees, Traversal Algorithms using Stacks, Header Nodes; Threads, Binary Search Trees Searching and Inserting in Binary Search Trees, Deleting in Binary Search Tree, AVL Search Trees, Insertion in an AVL Search Tree, Deletion in an AVL Search Tree,
- 2 Unit - II Graph Theory  
Terminology, Sequential Representation of Graphs; Adjacency matrix, Path Matrix, Warshall's Algorithm, Shortest Paths, Linked Representation of a Graph, Operations on Graphs, Traversing a Graph, Posets; Topological Sorting.
- 3 Unit - III Searching & Sorting:  
Introduction, Sorting, Insertion sort, Selection sort, Merging, Merge-Sort, Radix Sort, Searching and Data Modification, Hashing.

**Assignment:**

Question to be solved from supplementary problems from the core reference book recommended below: 7.1, 7.2, 7.3, 7.4, 7.9, 8.1, 8.5, and 8.6.

**Core References:**

1. Data Structures: By Seymour Lipschutz, Tata McGraw-Hill Publication.

**Advance Reference:**

1. Fundamentals of Data structures, by Horowitz and Sahani (Galgotia publications).
2. An introduction to data structures and application, by Jean Paul Tremblay & Pal G. Sorenson (McGraw Hill).
3. Data Structures, by Tannenbaum, (PHI).

*K. Kishor Kumar*  
H/O-Principal  
Modern College of Computer Science & I.T.,  
Aurangabad. 4 / Page



Course: B.Sc.(C.S.)

Semester : III

Topic: Unix Operating System

Paper No.: CS302-T

1 Unit - I  
Overview of UNIX Operating System, basic features of Unix operating System, File Structure, CPU Scheduling, Memory Management, File System Implementation of Operating System Functions in UNIX.

2 Unit - II  
Basic commands ls, cat, cd, date, calendar, who, printf, tty, stty, uname, passwd, echo, tput, bc, script, spell and ispell, Files and Directories, File permission, Basic Operation on Files, Changing Permission Modes, Standard files

3 Unit - III  
Introduction to Shell Scripting, Shell Scripts, read, Command Line Arguments, Exit Status of a Command, The Logical Operators && and ||, exit, if, and case conditions, expr, sleep and wait, white, until, for, \$, @, redirection. The here document, set, trap, Sample Validation and Data Entry Scripts.

Define system Administration, Booting the system, Maintaining User Accounts, File System, and special files, Backup and Restoration

**TEXT BOOKS:**

1. Unix the ultimate guide, Sumitabha Das, TMH.

**REFERENCES:**

1. Advanced programming in the Unix environment, W.R.Stevens, Pearson education.
2. Unix system programming using C++, T.Chan, PHI.
3. Unix programming environment, Kernighan and Pike, PHI. / Pearson Education
4. Unix Internals The New Frontiers, U.Valahia, Pearson Education.
5. Unix for programmers and users, 3rd edition, Graham Glass, King Ables, Pearson Education.

*Kwaghmar*  
H/O Principal

Modern College of Computer Science & I.T.,  
Aurangabad, 5 | Page



Course: B.Sc.(C.S.)

Topic: P.C. Maintenance

Semester : III

Paper No.: CS303-T

**1 Unit – I: PC Architecture:**

Chassis/Case, Baby, Desktop, Tower Cases. Power Supplies, power connectors, mounting points. Motherboard, form factors, expansion/bus slots, CPU, RAM, BIOS, Chipset, motherboard ports and Controllers.

Video System, video controllers, resolution, video memory, Video Drives, IDE drive, SCSI controllers, CD Drive, DVD Drive, Modems, Input devices and their drivers, USB architecture, USB Host Control types.

**2 Unit – II: PC Assembly**

Opening the System, Closing the System, Tips for working inside a PC, Mounting Motherboard in cabinet, installation of cards, devices and then connecting cables. Role of CMOS Entering CMOS setup, Basic CMOS Optimization, Hidden CMOS Settings.

**3 Unit – III: Software Installation**

Operating System installation, Windows, Unix, Linux, Device driver Installation, Creating users, giving rights to user, Network setting of a PC, shearing files and devices on network. Installing Antivirus, Antivirus settings updating (Quick Heal/ Netprotector)

**Introduction to Laptop:** System Features, Laptop components, Processors, Motherboards, memory, power, expansion bus, hard disk & removable storage devices

**Books:**

- 1) Troubleshooting, Maintaining & Repairing PCs by Stephen J. Bigelow, Tata McGraw-Hill.
- 2) The Complete PC Upgrade and Maintenance Guide by Mark Minasi, BPB Publication
- 3) Fault Finding and Troubleshooting on Laptop.



*Kumar*  
IIC Principal  
Modern College of Computer Science & I.T.  
6 | Page





Course: B.Sc.(C.S.)

Semester : III

Topic: Programming in C++

Paper No.: CS304-T

**1 Unit – I: Introduction of OOP's**

Procedural Vs Object Oriented Programming, Basic concepts of Object Oriented Programming, Class, Object, Data Abstraction, Encapsulation, Inheritance, Polymorphism, Dynamic Binding, Message Passing, Benefits and applications of OOP, History and overview of C++, C++ program structure. Reference variables, Scope resolution operator, Member dereferencing operators, new and delete, cin and cout, The endl and setw manipulator.

**Functions in C++:**

Function prototype, Call by reference (using reference variable), Return by reference, Inline function, Default arguments, Const arguments.

**2 Unit – II: Function overloading:**

Different numbers and different kinds of arguments,

**Objects and Classes:**

Specifying a class, private and public, Defining member functions, Nesting of member function, Object as data types, Memory allocation for objects, static data members and member functions. Array of objects, Objects as function argument, returning objects, Friend function and its characteristics.

**3 Unit – III: Constructors and Destructors:**

Introduction, default and parameterized constructors, Multiple constructors in a class, Copy Constructor, Destructors

**Operator Overloading:**

Overloading unary operators, Rules for operator overloading, Overloading without friend function and using friend function, Overloading binary operators such as arithmetic and relational operators, Concatenating Strings, Comparison operators.

**Reference Books:**

1. Object Oriented Programming with C++ E. Balagurusamy, Tata McGraw-Hill Publishing
2. Object Oriented Programming In C++ Robert Lafore, Galgotia
3. Let us C++ YeshwantKanetkar; bpb publication

*Kwaghmare*

H/O Principal

Modern College of Computer Science & I.T.  
Aurangabad.



Course: B.Sc.(C.S.)

Semester : III

Topic: Database Management System

Paper No.: CS305-T

- 1 Unit – I: Basic Concept
  - Data Definition, Types of Data, Record and File, File based System & Processing
  - Database System Application, Purpose of Database System
  - Abstraction & Data Integration
  - Three level Architecture proposal for a DBMS.
  - Component of a DBMS: Users, Facilities & Structure.
  - Advantageous & Disadvantageous of DBMS.

**Data Modeling & Design**

  - Data Association -- Entities , Attributes & Association, Relationship among Entities, Representation of Association & Relationships
  - Data Model: Importance of Data Model, Types of Data Model: Relational, E-R, Semi-structured, Object-Oriented, Network & Hierarchical Data Model. Advantageous & Disadvantageous of above model.
- 2 Unit – II: **Entity-Relationship Data Model**
  - Entity , Entity Set, Types of Entities, Strong & Weak Entity, Representation
  - Attribute, Types of Attributes , Representation
  - Relationship : Binary & Ternary , Representation
  - Mapping Cardinality, Entity-Relationship Design Issues

**Relational Data Model**

  - Basic Structure of Relational Data Model, Database Schema
  - Constraints : Integrity Rule 1 & 2
  - Normal Form: Anomalies, Functional Dependency, Dependency Diagram, First Normal Form, Second Normal Form, Third Normal Form, Conversion from Universal to 1 NF, 1NF to 2 NF and 2NF to 3NF.
- 3 Unit – III: **Relational Algebra**
  - Basic Operation – Union , Intersection, Difference and Cartesian Product
  - Advance Operation- Projection, Selection, Join ( Inner and Outer) & Division
  - Examples based on above Operation.
  - Relation Algebraic Queries.

**Introduction to Oracle**

  - Oracle Software : Versions of Oracles, Products of Oracle, Tools of Oracle
  - SQL: Logging to SQL/ISQL, SQL plus worksheet.

Books:

- 1) Database System Concepts (Sixth Edition ) AviSilberschatz, Henry F. Korth,S. Sudarshan
- 2) An Introduction to Database Systems byBipin C. Desai
- 3) Easy Oracle SQL: Get Started First Writing SQL Reports with SQL.\*Plus By John Garmany
- 4) Mastering Oracle SQL By Sanjay Mishra, Alan Beaulieu

*Sanjay Mishra*  
I/C Principal

Modern College of Computer Science & I.T.  
Aurangabad. 1. 8 | Page



Course: B.Sc.(C.S.)

Semester : III

Topic: Statistical Method

Paper No.: CS306-T

- 1 **Introduction and basic concepts of Statistics**
  - Definition of Statistics, Scope and importance of Statistics.
  - Primary and Secondary data, Types of data : qualitative, quantitative, discrete, continuous, cross-section, time series, failure, industrial, directional data.
  - Graphical presentation: Histogram, frequency polygon, frequency Curves
  - Curves Diagrammatic presentation: Bar diagrams, Pie diagram, scatter diagram.
  - Classification of data: Discrete and continuous frequency distributions, inclusive and exclusive methods of classification, relative and cumulative frequency distributions.
- 2 **Measures of Central Tendency**
  - Concept of central tendency. For group and Ungroup data
  - Arithmetic mean (A.M.) simple and weighted Merits and demerits of A.M., Mode: Computation for frequency and non-frequency data.
  - Computation of mode, Merits and demerits of mode. Median: Computation for frequency and non-frequency data, computation. Merits & demerits of median.
  - Geometric mean (G.M.) computation for G M , Merits demerits and applications of G.M. Harmonic Mean ( H M ) computation for frequency, non-frequency data, merits, demerits.
- 3 **Measures of Dispersions**
  - Dispersion and measures of Dispersion ,
  - Range (definitions and problems) Quartile Deviation (definitions and problems) Mean Deviation (definitions and problems) Standard Deviation (definitions and problems) Variance, different formulae for calculating Variance.

Books:

1. Fundamental of Mathematical Statistics By S.C.Gupta and V.K. Kapoor

*Kwajhmar*  
HIC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad. 9 | Page



Course: B.Sc.(C.S.)

Semester : III

Topic: Data Structure using C++

Paper No.: CS307P (A)

Minimum 10 Practicals to be performed as per the guidelines of teaching Faculty depending upon all theory units of concerned subject.

Course: B.Sc.(C.S.)

Semester : III

Topic: Database Management System

Paper No.: CS307P(B)

- 1) Design five schemas for any organization like: College, school, hospital, travel agency, company, bank etc.
- 2) Normalize the above five selected schemas as per 1NF,2NF and 3NF
- 3) Draw E-R Diagram for the same.
- 4) Solve atleast ten Relational Algebraic Queries

Course: B.Sc.(C.S.)

Semester : III

Topic: P.C. Maintenance

Paper No.: CS308P(A)

1. Identification of the various components inside the PC Cabinet.
2. Connecting Various device to PC
  - a. Input Devices (Mouse, Keyboard, Scanner, Mic etc.)
  - b. Output Devices (Monitor, Printers, Speakers, Head Phones, Projector etc.)
  - c. Storage Devices (Pen Drive, Memory Cards, External HDD, etc.)
3. Connection of SMPS to Mother board and other components.
4. Mounting and dismounting of CMOS Battery, Processor, HDD, RAM, CD/DVD drive, Mother board
5. Making various BIOS settings like booting device sequence, enabling and disabling various ports, setting system time, date, max temperature etc.
6. Formatting HDD, creation of Partitions, Installation of Operating System, Creating Users setting rights to user, shearing devices, sharing files and folders, accessing networking devices, Files and folders. Use of Disk clean up, disk defragmentation, installation of regional fonts.
7. Installation of Antivirus, installing it's updates and patches, it making various settings.
8. Assembly and Disassembly of Battery, CD/DVD, RAM, HDD etc. of Laptop.
9. Assembly and Disassembly of Battery, CD/DVD, RAM, HDD etc. of Laptop.
10. Assembly and Disassembly of Battery, CD/DVD, RAM, HDD etc. of Laptop.

Course: B.Sc.(C.S.)

Semester : III

Topic: Unix

Paper No.: CS308P(B)

Minimum 10 Practicals to be performed as per the guidelines of teaching Faculty depending upon all theory units of concerned subject.

Co-ordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.

*Kwaghmar*  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



1. B.Sc.Comp.Sci. Itrd Yr. Sem.III & IV . 13 -

ICP Principal  
Modern College of Computer Science & I.T.  
Aurangabad



Course: B.Sc.(C.S.)

Semester : IV

Topic: Software Engineering

Paper No: CS401-T

- 1 Unit I: Software and Software Engineering  
What is Software, Characteristics of software, categories of Software, attributes of WebApps, software Engineering, Software Process, Essence Software Engineering Practice, General Principles, Software Myths, Software Process and Process Models

Software process Model Process Flow, Process Models, Waterfall model, Incremental Process Model, Evolutionary Process Models, Concurrent Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Product and Process

- 2 Unit-II: Agile

Introduction to Agility: Agility and the Cost of Change, Agile Process, Agility Principles, Human Factors, Extreme Programming (XP), XP Values, XP Process, Industrial, Critics of XP

Other Agile Process Models

Adaptive Software Development (ASD), Scrum, Dynamic Systems Development Method (DSDM), Crystal, Feature Driven Development (FDD), Lean Software Development (LSD), Agile Modeling (AM), Agile Unified Process (AUP)

- 3 Unit III: Principles That Guide Practice  
Principles That Guide Process, Principles That Guide Practice, Communication Principles, Learning Principles, Modeling Principles, Construction Principles, Deployment Principles

Reference Books:

1. Software Engineering a Practitioner's Approach By Roger S. Pressman (Seventh Edition) McGraw Hill.
2. An Integrated Approach to Software Engineering, Pankaj Jalote, Narosa

*Answer*



Course: B.Sc.(C.S.)

Semester: IV

Topic: Fedora

Paper No.: CS402-1

1. **Unit-I Introduction to Fedora**
  - Basic concepts of Operating System, Kernel, Shell & File System structure
  - Basic concepts of Linux
  - What is Linux, Linux's Roots in Unix, Linux Features, Advantages of Linux.
  - What is Fedora, Features of Fedora
  - Installing Fedora
  - Differences between CentOS, Red Hat Enterprise Linux & Fedora
  - Basic commands of Linux
  - Advanced Linux Commands
2. **Introduction to Graphical Environment**
  - Logging to Fedora : Desktop : GNOME & KDE
  - Differences between GNOME & KDE
  - Features of GNOME & KDE
  - Use and customize the GNOME interface
  - Perform command tasks using the GNOME GUI
  - Launch applications from command line & GNOME interface
  - Customize X Window System
3. **Software Package Administration**
  - Installing and deleting software packages
  - Querying and updating software packages
4. **User and Group Administration**
  - Creating and deleting users from the system
  - Modifying users profile
  - Creating and deleting groups
  - Important system files related to user administration
5. **Advanced File Permissions**
  - Assigning advanced files permissions i.e. chmod, chown, chgrp & Sticky bit
  - Creating, modifying and deleting ACL's
6. **Disk Partitioning and Mounting File System**
  - Using fdisk, disk druid utilities for disk partitioning
  - Using mkfs, commands to create file systems
  - Mounting various file systems
  - Auto mounting of file system

Notes:

1. Bible Fedora 14

*Kalyan*  
Principal  
Modern College of Science & Technology  
Pune, India.



Course: B.Sc.(C.S.)

Semester : IV

Topic: Base of Networking

Paper No.: CS403-T

**1 Unit-I**

**Introduction**

Communication System, Components of communication system, Computer network Advantages and applications of computer n/w. point-to-point and multipoint line configuration, LAN, MAN and WAN. Analog and Digital signals, Data Transmission: Parallel and Serial, Synchronous and Asynchronous transmission, Transmission Mode: Simplex, half-duplex and full-duplex.

**Network Topologies**

Mesh, Star, Tree, Bus and Ring and Hybrid Topology (Advantages and disadvantages of each)

**2 Unit- II**

**Transmission media**

Guided and unguided media, Twisted-pair, UTP and STP cable, coaxial cable, Optical Fiber cable, Radio waves, Microwaves, Satellite Communication (*Transmission characteristics and advantages of each type*)

**Modulation & Multiplexing**

Concept of modulation and demodulation, Digital-to-analog conversion, Amplitude Shift Keying (ASK)/AM, Frequency Shift Keying (FSK)/FM, Phase Shift keying (PSK)/PM.

**3 Unit- III**

**THE MOBILE TELEPHONE SYSTEM:**

First Generation(1G), Second Generation(2G), Third Generation(3G), Internet over cable, Spectrum Allocation, cable Modem, ADSL Versus Cable.

**Reference Books:**

1. Introduction to Digital and Data Communications, Michael A Miller, JAICO, publishing.
2. Data Communication and Networking: C.S.V. Murthy, Himalaya Publishing House
3. Data Communication and Networking :: Behrouz A. Forouzan; Mc-Graw Hill Pub.
4. Computer Networks by A. S. TANENBAUM, DAVID J. WETHERALL, PRENTICE HALL Publication

*K. S. Murthy*  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aut. 14 | Page





Course: B.Sc.(C.S.)

Semester : IV

Topic: Core Java

Paper No.: CS404-T

**1 Unit-I: Object oriented paradigm**

Basic concepts of Object oriented programming: class & object, data abstraction and encapsulation, inheritance, polymorphism, dynamic binding, message communication. Benefits and applications of OOP. History and features of Java. Java Vs. C++. Java and Internet, Java and www. Java environment. Structure of java program, symbolic constants. Data types.

**Arrays, Classes and Objects**

Declaration and initialization, one and multidimensional arrays Defining a class, adding variables and methods, creating objects, static fields and static methods. Method overloading, Constructors: types and multiple constructors in class. Command line arguments.

**2 Unit-II: Inheritance**

Super and sub class, defining a subclass. Single inheritance, multilevel inheritance and hierarchical inheritance. Subclass constructors. Super keyword, Visibility controls, Method overriding, Dynamic method dispatch, Abstract methods and class.

**Interfaces, String and Vector Class**

Defining interfaces, implementing interfaces, extending interfaces, accessing interface variables. String class and its methods, Vectors

**3 Unit-III: Packages**

Introduction, Java API packages, Naming conventions, creating and accessing user defined package, using a package, adding a class to a package, importing classes from package.

**Exception handling and Multithreading**

Exceptions, syntax of exception handling code, multiple catch statements, throw: throwing own exceptions, throws and finally Introduction to multithreading, creating threads by extending the Thread class and by implementing Runnable interface, implementing the run() method, Life cycle of a thread, Thread methods and thread priority.

**Books:**

1. Programming with JAVA: E. Balagurusamy, Tata Mc-Graw Publishing Company Ltd.
2. The Complete Reference J2SE: Herbert Schildt, Tata Mc-GrawPub. Comp.Ltd.
3. Core Java-2 Vol-I & Vol-II - Cray S. Horsmann, Gray Corneel; Pearson Education, Low Price edition

*K. K. Kulkarni*  
HOD Principal

Modern College of Computer Science & I.T. Aurangabad | Page



Course: B.Sc.(C.S.)

Semester : IV

Topic: Advance Database Management System

Paper No.: CS405-T

- 1 Unit – I: Structured Query Language
  - DDL Statements to Create and Manage Tables using Create & Alter
  - Manipulating Data using Insert, Update & Delete Statement
  - Retrieving Data Using SQL Select, Restricting and Sorting Data, Using Single-Row functions, Conversion Functions and Conditional Expressions
  - Aggregated Data Using Group Function, Displaying data from Multiple tables, Sub queries, Set Operators
- 2 Unit – II: Data Storage
  - Overview of Physical Storage Media
  - Magnetic Disk
  - RAID
  - Tertiary Storage
  - Storage Access

**Database System Architecture**

  - Centralized and Client-Server Architecture
  - Server System Architecture
  - Parallel System
- 3 Unit – III: Transaction Processing
  - Transaction Concept
  - Transaction State
  - Implementation of Atomicity and durability
  - Concurrent Execution

**Concurrency Control Techniques**

  - Lock-Based Protocol
  - Timestamp-Based Protocol
  - Deadlock Handling

Books:

- 1) Database System Concepts (Sixth Edition) AviSilberschatz, Henry F. Korth,S. Sudarshan
- 2) An Introduction to Database Systems byBipin C. Desai
- 3) Easy Oracle SQL: Get Started Fast Writing SQL Reports with SQL\*Plus By John Garmany
- 4) Mastering Oracle SQL By Sanjay Mishra, Alan Beaulieu



*Kumar*  
I/C Principal  
Modern College of Computer Science & I.T.  
August 2024



Course: B.Sc.(C.S.)

Semester : IV

Topic: Web Fundamental

Paper No.: CS406-T

**1 Unit-I: Introducing HTML5**

- Understanding HTML, XHTML, and HTML5, Introducing semantic markup, Syntax, Attributes, Working with elements, Creating an HTML document
- Embedding content, Embedding HTML by using inline frames, Working with hyperlinks, Adding images to your HTML document, Embedding plug-in content

**Advances of HTML5**

- HTML5 Layout container
- Format using <div> element
- Working with Tables: creating regular and irregular tables, heading, columns and rows, captions, header, footer.

**2 Unit-II: Introducing JavaScript**

- Basic of JavaScript
- JavaScript Variables, Operators & Its Precedence, Special Values, Predefined Built-In Functions, Functions Declaration & Call
- String Functions
- Conditions and looping structure,
- Inline JavaScript & External JavaScript

**Advances in JavaScript**

- Object in JavaScript, Concept of array, how to use it in JavaScript, types of an array, array methods
- DOM Concept in JavaScript, DOM Objects, DOM Search Methods
- Event handling in JavaScript: Capturing & Bubbling, Subscribing, Unsubscribing and Cancelling Event, Windows Event, Keyboard and Mouse Events.

**3 Unit-III: Cascading Style Sheet**

- Introduction to CSS3
- Defining and Applying a Style, Inline, Embedded and External Style Sheet.
- Selectors: element, id and class selector, grouping selector, attribute, Specificity and cascading
- CSS properties: Color, box Model, border, padding, margin, float, clear

**Books:**

- 1) Programming in HTML5 with Javascript and CSS3 , Glenn Johnson  
([http://www.daoudisamir.com/references/vs\\_ebooks/html5\\_css3.pdf](http://www.daoudisamir.com/references/vs_ebooks/html5_css3.pdf))
- 2) Beginning HTML5 and CSS3 By Richard Clark, Oli Studholme, Christopher Murphy and Divya Manian. ([http://www.alvinisd.net/cms/lib03/TX01001897/Centricity/Domain/1077/beginning\\_html5\\_and\\_css3.pdf](http://www.alvinisd.net/cms/lib03/TX01001897/Centricity/Domain/1077/beginning_html5_and_css3.pdf))
- 3) A Definitive Guide to HTML5 , By Adam Freeman

*Kwaghmare*  
Principal

Modern College of Computer Science & Technology  
Aurangabad.



Course: B.Sc.(C.S.)

Semester : IV

Topic: Practical Based on Java in Fedorn O.S.

Paper No.: CS407P (A)

Minimum 10 Practicals to be performed as per the guidelines of teaching Faculty depending upon all theory units of concerned subject.

Course: B.Sc.(C.S.)

Semester : IV

Topic: Practical Based on Web Fundamental

Paper No.: CS407P(B)

- Exercise 1. Create a simple website by using Visual Studio Express
- Exercise 2. Create additional pages
- Exercise 3. Embedding Content
- Exercise 4. Create a webpage using <table> and <div> elements
- Exercise 5. Create a webpages using conditional and looping statements.
- Exercise 6. Create a calculator webpage
- Exercise 7. Create a Webpage to introduce National Bird/Animal/Emblem/Flower
- Exercise 8. Learn more about positioning by adding more <div> elements to the webpage to define a header and footer for the page. Use CSS style rules to set the position.
- Exercise 9. Learn more about CSS selectors by adding more elements to the page and try setting the format by selecting the elements without using an id.
- Exercise 10. Learn more about colors by changing the color scheme, using RGB values.

*Yashwantrao*  
H.C. Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



Course: B.Sc.(C.S.)

Semester : IV

Topic: Practical Based on Adv. DBMS

Paper No.: CS408P(A)

- 1) Using SQL commands to create the tables and views of five schemas for any organization like: College, school, hospital, travel agency, company, bank etc.
- 2) Perform Data Definition Language Commands
- 3) Perform Data Manipulation Language Commands
- 4) Perform Minimum 10 Queries on each of the above five schemas.

Course: B.Sc.(C.S.)

Semester : IV

Topic: Mini Project Using VB.Net

Paper No.: CS408P(B)

Note:

- 1) It is expected that concerned Faculty is to introduce and make the students aware about the VB.Net in First Three-Four Practical before commencing of Mini-Project.
- 2) A mini project having minimum 5 forms, use VB.Net as a front end and any DBMS as backend. Team size maximum 2 students.

Minimum contents of Project Report

1. Introduction
2. Problem definition.
3. System Requirement Specification
  - 3.1. User Interview
  - 3.2. Current System flow diagram
  - 3.3. Proposed System.
4. E-R Diagram
5. DFD
6. Sample Screens
7. Conclusion

*Abhinav (MDC)*  
Co-ordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.

*Keshav Kumar*  
VIC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

**NAAC Re-accredited with Grade 'A'**

**Dr. Babasaheb Ambedkar Marathwada University**

Aurangabad-431004



## REVISED SYLLABUS OF

B.Sc. (Computer Science)

Three Year Course

(With Effective From: 2014-15)



**हे ज्ञानिची पवित्रता | ज्ञानीचि आधि ||**

**Dr. Babasaheb Ambedkar Marathwada University**

Aurangabad-431004.

Tel.No. : 0240-2403400/431, Fax:0240-2403113

Website : [www.bamu.ac.in](http://www.bamu.ac.in), <http://bamu.digitaluniversity.ac.in>

*Kwajimmar*

IIC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



**Dr. Babasaheb Ambedkar Marathwada University.**  
**Appendix 'A'**

A Candidate shall be admitted to the I year of the B.Sc. (Computer Science) degree course only if he/she satisfies the following condition:

1. He/ She must have passed the higher secondary (multipurpose) examination conducted by H.S.C. board Government of Maharashtra with science / technical subjects Or an Examination of any statutory University and Board recognized as equivalent thereto.

OR

He/She must have passed examination prescribed at the end of second year of the junior college conducted by the H.S.C. board, Government of Maharashtra with English, Second language, Physics, Chemistry, Mathematics and or Biology or one of the technical subjects prescribed at the said examination as the optional or elective subjects or an examination recognized as equivalent thereto.

OR

Candidate having offered prescribed vocational course (MCVC) with Computer techniques/I.T./Electronics.

OR

Three years Diploma Course in engineering conducted by the board of technical Education, Maharashtra State.

2. He/ She must have passed at qualifying examination.

A candidate who has passed the B.Sc.(Computer Science) examination of this university may be allowed to present himself subsequently at the degree examination in a subject or subjects other than those he has taken earlier provided that he puts in three years of attendance as a regular candidate for First, Second and Third year in the subject or subjects concerned excluding compulsory English, Second Language and remaining optional subject(s).

A candidate shall not be allowed to appear for such examination if he has passed the higher examination.

*K. S. Kulkarni*

VC, Principal

Revised Syllabus of B.Sc. (Computer Science), Dr. B.A.M.U. A'bad w.e.f.: 2014-15  
Modern College of Computer Science & I.T.  
Aurangabad.

1. SU-02 B.Sc. Computer Science Sem.- V & VI



The Degree of Bachelor of Science (Computer Science) shall be conferred on a candidate who has pursued a regular course of study consisting of six semesters in the relevant subject as prescribed and has appeared at the end examination and passed under the credit based system in all the examination prescribed for the Degree course in the faculty.

The pattern of the examination and the scope is indicated in the syllabus. [Annexure B]

The Number of students in a theory class shall not exceed 60.

Maximum number of students in a batch for practicals in first four semesters shall consist of 20 students and for fifth & sixth semester the batch shall consist of 15 students.

The rules for admission to the subsequent (next) semesters will be the same as per the University guidelines.

For Each course the concerned teacher will have to conduct Class tests after completion of 15 and 20 lectures. The mark list of the same is to be submitted to the university authority within 7 working days after the completion of class tests.

Final Examination will be conducted by the University based on the complete syllabus.

Final Practical Examination will be conducted by the university and examiners will submit the marks in the prescribed format of students for practical examination to the university.

**The Number of Teaching Staff & infra-structure required to run the course will be as follow:-**

The graduation is very important phase in the life of our young students. The college responsibly is not only to deliver a quality syllabus based education, but also to motivate them to be a good healthy citizen. In this direction, the college must have sufficient facilities to run the course. A guideline is listed below. The College must have following minimum facilities:

**Infrastructure:**

*K. K. Kulkarni*  
H/C Principal  
Modern College of Computer Science & I.T.  
Aurangabad.

Revised Syllabus of B.Sc. (Computer Science), Dr. B.A.M.U. Aurangabad w.e.f. 2014-15





1. One Class room to accommodate 60 students. (approximately 250 sq.ft.)
2. A well equipped software Laboratory having a LAN system of 30 nodes and having internet connectivity with broad band. All legal software, antivirus software, firewall be available for smooth functioning of the laboratory.
3. A hardware laboratory having twenty microprocessor kits with add on cards as per their syllabus. Staff room of 100 sq.ft. with one table and one Almeria for each faculty member.
4. One office space of 100 sq.ft. with appropriate furniture.
5. One lady room of 100 sq.ft. with attached toilet.
6. One reading room of 200 sq.ft. with seating arrangements for at least 30 people. The library may be accommodated in the library.
7. One copy of every text book among five students for each subject be available along with one copy of reference book as per the syllabus.
8. Library must subscribe for computer and scientific magazines. Appropriate general reading materials must be available for overall development of students.
9. An open space for sports activities. The college must be encouraged to have sport equipments.

**Staff:**

1. The head of the department in the scale of reader/Professor.
2. The minimum number of teachers must be appointed as per the work load. Per semester, the work load may be computed on the basis of theory classes, tutorials and practical class per batch. Minimum number of teachers to run the course must be five excluding the head. Teachers must be appointed by the university/UGC norms. The quality of the course is directly related to quality of teachers for the course.
3. There must be one clerk in the office to look after administrative work. The placement of all staffs must be maintained properly.
4. One qualified librarian  
An appropriate number of class IV employees.

*K. Srinivas*



## Curriculum Structure and Scheme of Evaluation: B.Sc.(C.S.)

Sr. No.	Paper Number	Name of the Paper Titles	Scheme of Teaching		Scheme of Evaluation(Marks)		Total Mark
			Theory / Practical (Lect. /week)	Theory / Practical (Marks)	Exam Duration (in hrs.)	Total Mark	
<b>I Semester</b>							
1	CS101-T	Computer Fundamentals	3	50	2	50	50
2	CS102-T	Digital Electronics	3	50	2	50	50
3	CS103-T	Microprocessor - I	3	50	2	50	50
4	CS104-T	C Programming – I	3	50	2	50	50
5	CS105-T	Communication Skill – I	3	50	2	50	50
6	CS106-T	Mathematical Foundation	3	50	2	50	50
7	CS107-P	Office Suite	4	50	2	50	50
8		C Programming – I	4	50	2	50	50
9	CS108-P	Microprocessor – I	4	50	2	50	50
10		Digital Electronics	4	50	2	50	50
<b>II Semester</b>							
1	CS201-T	Data Structure	3	50	2	50	50
2	CS202-T	Operating System	3	50	2	50	50
3	CS203-T	Microprocessor – II	3	50	2	50	50
4	CS204-T	C Programming – II	3	50	2	50	50
5	CS205-T	Communication Skill – II	3	50	2	50	50
6	CS206-T	Numerical Computation Methods	3	50	2	50	50
7	CS207-P	Data Structure	4	50	2	50	50
8		Microprocessor – II	4	50	2	50	50
9	CS208-P	C Programming – II	4	50	2	50	50
10		Numerical Comp. Methods	4	50	2	50	50

*Kwaghmar*  
 I/C Principal  
 Modern College of Computer Science & I.T.,  
 Aurangabad.

1. SU-02 B.Sc. Computer Science Sem.- V & VI



Sr. No.	Paper Number	Name of the Paper Titles	Scheme of Teaching		Scheme of Evaluation(Marks)		Total Mark
			Theory / Practical (Lect./ week)	Theory / Practical (Marks)	Theory / Practical (Marks)	Exam Duration ( in hrs.)	
<b>III Semester</b>							
1	CS301-T	Advance Data Structure	3	50	2	50	50
2	CS302-T	Unix Operating System	3	50	2	50	50
3	CS303-T	PC Maintenance	3	50	2	50	50
4	CS304-T	Programming in CPP	3	50	2	50	50
5	CS305-T	Database Management System	3	50	2	50	50
6	CS306-T	Statistical Method	3	50	2	50	50
7	CS307-P	Data Structure using CPP	4	100	2	100	100
8		DBMS					
9	CS308-P	PC Maintenance	4	100	2	100	100
10		Unix					

<b>IV Semester</b>							
1	CS401-T	Software Engg.	3	50	2	50	50
2	CS402-T	Fedora	3	50	2	50	50
3	CS403-T	Basic of Networking	3	50	2	50	50
4	CS404-T	Core Java	3	50	2	50	50
5	CS405-T	Adv. DBMS	3	50	2	50	50
6	CS406-T	Web Fundamental	3	50	2	50	50
7	CS407-P	Java in Fedora OS	4	100	2	100	100
8		Web Fundamental					
9	CS408-P	Based in Adv. DBMS and N/w	4	100	2	100	100
10		Mini Project					

*K. S. Mahapatra*

H/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



Sr. No.	Paper Number	Name of the Paper Titles	Scheme of Teaching		Scheme of Evaluation (Marks)		Total Mark
			Theory / Practical (Lect./week)	Theory / Practical	Theory / Practical (Marks)	Exam Duration (In hrs.)	
<b>V Semester</b>							
1	CS501-T	Software Cost Estimation	3		50	2	50
2	CS502-T	Basic of Android O. S.	3		50	2	50
3	CS503-T	Core Java-II	3		50	2	50
4	CS504-T	Basic of Computer Graphics	3		50	2	50
5*	CS505-T	Beginners Prog. with PHP	3		50	2	50
6*	CS506-T	Basic of ASP.Net	3		50	2	50
7 <sup>#</sup>	CS507-T	Data Mining	3		50	2	50
8 <sup>#</sup>	CS508-T	Advanced Networking	3		50	2	50
9	CS509-P	Pr. Based on Adv. Java	4		100	2	100
10		Pr. Based on Comp. Graphics	4				
11	CS510-P	Pr. Based on Android O.S.	4		100	2	100
12		Pr. Based on PHP/ASP.Net	4				
<b>VI Semester</b>							
1	CS601-T	Software Quality & Testing	3		50	2	50
2	CS602-T	Android Application Development	3		50	2	50
3	CS603-T	Theory of Computation	3		50	2	50
4	CS604-T	Advanced Computer Graphics	3		50	2	50
5*	CS605-T	Advanced Prog. With PHP	3		50	2	50
6*	CS606-T	Programming Language: C#	3		50	2	50
7 <sup>#</sup>	CS607-T	e-Commerce	3		50	2	50
8 <sup>#</sup>	CS608-T	Ethics and Cyber Law	3		50	2	50
9	CS609-P	Pr. Based on Android Develop.	4		100	2	100
10		Pr. Based on PHP / C#	4				
11	CS610-P	Major Project	8		100	4	100
12							

\* and #: Any one paper is to be opted from the group

*Kwaghmax*  
9



## PATTERN OF QUESTION PAPERS

- Note : 1) All questions carry equal marks.  
 2) All questions are compulsory.

Q. No.	Format	Marks
1.	Multiple Choice/Fill in the blank/Match the pair/ one line answer. 1) 2) . 10)	1 x 10 = 10
2.	a) b)  OR a)	5 * 2 = 10
3.	a) b)  OR a)	10
4.	a) b)  OR a)	5 * 2 = 10
5.	Write Short Notes On: (Any Two ) a) b) c) d)	10
	<b>Total</b>	<b>50</b>

\* Not More than 3 bits should be asked in each question of 10 Marks.

(Only for Paper Setter)  
 I/C Principal  
 Modern College of Computer Science & I.T.,  
 Aurangabad.



# B.Sc.(Computer Science)

## Semester - V



**Course: B.Sc.(C.S.) – V Seme**

**Paper Code: CS-501**

### **Software Cost Estimation**

#### **Unit- I**

##### **Introduction**

Observation on Estimation, Planning process, Software Scope and Feasibility, Types of Resources, Project estimation.

#### **Unit-II**

##### **Decomposition Techniques**

Software sizing, Problem-Based Estimation, LOC-Based Estimation with example, FP- Based Estimation with example, Process-Based Estimation with example, Designing Use Cases, Use Cases- Based Estimation with example, Estimate Reconciliation.

#### **Unit-III**

##### **Empirical Estimation Models**

Structure of Estimation Model, COCOMO Models, Software Equation, Estimation for Object-Oriented Projects, Estimation for Agile Development, Estimation for Web Projects, Creating a Decision Tree, Outsourcing.

##### **Reference Books:**

1. Software Engineering a Practitioner's Approach By Roger S. Pressman (Seventh Edition) McGraw Hill
2. An Integrated Approach to Software Engineering, Pankaj Jalote, Narosa.

*Pankaj Jalote*  
HIC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



**Course: B.Sc.(C.S.) – V Seme**

**Paper Code: CS-502**

### **Basic of Android Operating System**

**Unit – I**      **Environment Setup:** Setup Java Development Kit (JDK), Android SDK,

Eclipse IDE, Android Development Tools (ADT) Plugin, Create Android Virtual Device, Architecture: Linux kernel, Libraries, Android Runtime, Application Framework.

#### **Application Components**

Application Components Activities, Services, Broadcast Receivers, Content

Providers, Additional Components, Create Android Application Anatomy of Android Application, The Main Activity File, The Manifest File, The Strings File, The R File, The Layout File, Running the Application.

### **Unit-II**

**Resources Organizing & Accessing:** Alternative Resources, Accessing Resources

**Intents and Filters:** Intent Objects, Action, Android Intent Standard Actions, Data, Category, Extras, Flags, Component Name, Types of Intents: Explicit Intents, Implicit Intents.

#### **UI Layouts**

Android Layout Types, Relative Layout Attributes, Grid View Attributes, Sub-Activity, Layout Attributes, View Identification, UI Controls, Android

UI Controls, TextView Attributes, AutoComplete Text View Attributes, Button Attributes, ImageButton Attributes, CheckBox Attributes, ToggleButton Attributes, RadioButton Attributes, RadioGroup Attributes.

### **Unit-III**

#### **Event Handling:**

Event Listeners & Event Handlers, Event Listeners Registration, Styles and Themes, Defining Styles, Using Styles, Style Inheritance, Android Themes, Default Styles & Themes, Custom Components, Creating a Simple Custom Components.

### **Books & References:**

- 1) Android Tutorial, Simply Easy Learning by tutorialspoint.com.  
Link:[http://www.tutorialspoint.com/android/android\\_tutorial.pdf](http://www.tutorialspoint.com/android/android_tutorial.pdf)
- 2) Professional Android 4 Application Development :Retomeier, Wrox publication.



1. SU-02 B.Sc. Computer Science Sem.- V & VI

- 3) Andriod Apps for Absolute beginners : Wallace Jadson, Apress.
- 4) The Complete Andriod Guide: Kevin Purdy
- 5) Javapoint Tutorial : <http://www.javapoint.com/android-tutorial>



*Kanishk*  
H/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

**Course: B.Sc. (C.S.) – V Seme**

**Paper Code: CS-503**

**Core Java-II**

**Unit – I**

**Input/Output Stream:** File, Directories, FilenameFilter, Byte stream, Character stream, InputStream ,OutputStream ,Working with Reader classes, InputStreamReader, BufferedReader , FileInputstream , FileOutputStream, Writer classes

**Utilities:** Simple Type Wrapper: Number, Character, Boolean,

Enumerations: Dictionary and StringTokenizer, Date,Math :Tramscentdentials, Exponential, Rounding function,

**Unit -II**

**Applets :** Introduction to Applet , Types of Applet, Applet vs Application , Applet class, advantages of Applet , Applet Lifecycle, My First Applet, Applet tag, Passing Parameters to Applet .

**Graphics:**Basic Shapes: drawLine, drawArc, fillArc, drawPolygon, fillPolygon, Color & Color Methods, Fonts.

**Unit III**

**Java Database Connectivity (JDBC):** Design of JDBC, JDBC configuration, Executing SQL statement, QueryExecution, Scrollable and updatable resultsets, row sets, metadata, Transaction Processing.

**Networking:** InetAddress, Datagrams, Socket for client and Server, URL, URL Connection.

**Reference Books:**

1. Java Complete Reference, Herbert Schildt, Seventh Edition, Tata McGraw Hill.
2. Java Handbook, Herbert Schildt, Tata McGraw Hill.
3. Java EE 6 for Beginners, Sharanam Shah, Vaishali Shah, Shroff Publishers and Distributors
4. Advanced Java™ 2 Platform How to Program by H. M. Deitel , P. J. Deitel,S. E. Santry  
Prentice Hall publication.



*K. K. Kulkarni*

**IIC Principal**

Revised Syllabus of B.Sc. (Computer Science), Dr. B.A.M.U. A'bad w.e.f.: 2014-15  
Modern College of Computer Science & I.T.,  
Aurangabad.



**Course: B.Sc.(C.S.) – V Sem**

**Paper Code: CS-504**

### **Basic of Computer Graphics**

#### **Unit-I**

##### **Basics Concept in Computer Graphics**

Introduction to Computer Graphics, Application of Computer Graphics, Classification of Computer Graphics, Types of Graphics Devices, Video Display Devices, Input Devices, Display File and its Structure, Display file Interpreter, Display Processor, Graphics file Format.

##### **Graphics in C:**

Introduction to graphics in C : initgraph(), detectgraph() and closegraph() function, Drawing object in C , Line, Circle, Rectangle, Ellipse, Changing foreground & background colors, Filling object by color function.,drawpoly, fillpoly, floodfill, getcolor, settext, outtext,style,fonts,coloring.

#### **Unit-II**

##### **2-D Transformation**

Translation, Rotation, Scaling, Homogenous Coordinates for Translation, Homogenous Coordinates for Rotation, Homogenous Coordinates for Scaling, Compositogation from 2D Transformation, Other TransformationReflection, Shear, and Inverse Transformation.

#### **Unit-III**

##### **Line, Circle and Character Generation**

Basics concept in line Drawing, Line Drawing Algorithm, Digital Differential Analyzer, Bresenham's Line Algorithm, Antialiasing of Lines, Method of Antialiasing, Increasing Resolution, Unweighted Area Sampling, Pixel Phasing, Representation of Circle ,Polynomial Method, Trigonometric Method, Circle Drawing Algorithm, DDA Circle Drawing Algorithm, Bresenham's Circle Drawing Algorithm, Character Generation, Stroke Method, Starburst Method, Bitmap Method.

#### **Text Books:**

1. Procedural Elements for Computer Graphics: D.F.Rogers
2. Mathematical Elements for Computer Graphics: D.F.Rogersand J.A.Adams
3. Computer Graphics : A.P.Godse, ( IIIrd Edition) ,Technical Publication

#### **Reference Books:**

1. Computer Graphics by M. Pauline Baker, Donald Hearn, (2ndEdition) PHI Publication
2. Principles of Interactive Computer Graphics By. William. M. Newman. (IInd Edition) Mc.Graw Hill Publication.
3. Computer Graphics by V.K. Pachghare, (II nd Edition), Laxmi Publication



**Course: B.Sc.(C.S.) – V Seme**

**Paper Code: CS-505**

**Beginners Programming with PHP**

**Unit-1:**

Introduction to PHP: What is PHP? Why PHP? Evolution of PHP.  
Installation: PHP on windows and Linux. Configuring: Apache & PHP,  
Running & Testing PHP Script, Combining PHP with HTML.  
PHP Language Basics: Building blocks of PHP: Variables, Data Types,  
Operators and Expressions and Constant.  
Decision within PHP: *if* , *if.. else*, *if.. elseif* .. *else*, *switch*, Ternary  
Operator

**Unit – 2:**

Looping within PHP: *while*, *do...while*, *for*, *Break* & *Continue*  
statement Functions in PHP: What is function, why functions, Calling  
function, Returning Value from function, Recursive function.  
Arrays in PHP: What & Why Array, Creating Array, Associative Array,  
Multidimensional Arrays, Accessing Array, Manipulating Arrays,  
Sorting Arrays, Merging Arrays,

**Unit -3:**

Objects in PHP: What is Class & Object, Creating a Class & Object,  
Object properties, object methods, Overloading, inheritance,  
Constructor and Destructor. String in PHP: Creating and Accessing  
String, formatting String, Searching String, Manipulating String.  
Date and Time: Understanding TimeStamp, Getting Date and time,  
Extracting values of date-time, Formatting date-time.

**Reference Books:**

- 1) **Beginning PHP 5.3** , Author: Matt Doyle, Wiley Publishing, Inc.
- 2) **SAMS Teach yourself PHP in 24 hours**, Author: Matt Zandstra, Sams Publishing.
- 3) **“PHP, MySQL and Apache All in One”** , Author: Julia C. Meloni, SAMS series

*Kwaghmar*

W/C Principal

Modern College of Computer Science & I.T.,  
Aurangabad.

**UNIT I -**

Web designing, web browser, web pages, home page, web site, web servers, world wide web, Concepts of hypertext, hypermedia, versions of HTML, Evolution of .NET, Benefits of .NET Framework, Architecture of .NET Framework, Components of .NET Framework.

**UNIT II -**

ASP.NET Page Life Cycle, understanding ASP.NET controls, applications, web servers, installation of IIS. Web forms, web form controls, server controls, client controls, adding controls to web form, buttons, text box, labels, checkbox, radio buttons, list box, drop, down list, Ad rotator control. Adding controls a runtime, Running a web application.

**UNIT III -**

Creating a multiform web project, Form validation: client side and server side validation, Validation controls: Required Field Validator, Range Validator, Comparison Validator, Regular Expression Validator, Custom Validator, Validation Summary, Calendar control.

**References:**

- 1) .NET 4.0 Programming(6-in-1) Black Book- (Dremtech Press)
- 2) The Completer Reference ASP.NET – Mathew Macdonald (TMH)
- 3) Professional ASP.NET – Wrox publication
- 4) VB.NET Programming Black Book – Steven Holzner (Dreamtech pub.)
- 5) Introduction to .NET framework – Wrox publication.
- 6) ASP.NET Unleashed - bpb publication.



*Khadim*

I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



**Course: B.Sc.(C.S.) – V Seme**

**Paper Code: CS-507**

**Data Mining**

**Unit -1**

**Data Mining Introduction:**

What is Data Mining?, Definition, DBMS Vs Data Mining, DM Techniques, Issues and Challenges in DM, DM Application Areas, DM Applications-Case Studies, Current Trends Affecting DM, Basic Data Mining Task,

**Unit – 2**

**Association Rule:**

What is an Association rule?, Method to discover Association Rule, A Priori Algorithm, Partition Algorithm.

**Clustering Techniques:** Clustering Paradigm, Partitioning Algorithm, Similarity and Distance Measure, Hierarchical Algorithm.

**Unit – 3**

**Decision Tree:** What is a decision tree? Tree Construction Principle, Best Split, Splitting indices, Splitting Criteria

**Web Mining:** Introduction, Web Content Mining, Web Structure Mining, Web Usage Mining.

**Reference:**

1. **Data Mining Techniques** : Arun K. Pujari ,
2. **Data Mining: Introductory and Advanced Topics**: M.H.Dunham Pearson Education.
3. **Data Mining: Concepts & Techniques**, Morgan Kaufman. 2006

*Key points*

## Advanced Networking

### Unit I

**The OSI reference model:** concept of layers, protocols, interfaces and services, TCP/IP model.

**Data Link Layer:** Error correction & detection, Types of errors, Detection VS Correction, Block Coding, Linear Block codes(single parity check, hamming codes), Cyclic codes, CRC Encoder & Decoder, CRC Polynomial, Checksum.

**Data Link Control & Protocols:** Framing, Flow & Error Control, Simplest, Stop-N-Wait, Stop-N-Wait ARQ, Go Back N ARQ, Selective Repeat ARQ, Piggybacking. HDLC

### Unit II

**Network Layer:** Logical addressing, IPv4 Addresses, Classful & Classless addresses, NAT, IPv6 Addressing,

**Network layer protocol:** Internetworking, IPv4, IPv4 protocol packet format, IPv6 Protocol & Packet format, IPv4 VS IPv6, Transition from IPv4 to IPv6, Address

**Resolution protocols:** (ARP, RARP), BOOTP, DHCP, Routing Protocols - Delivery, forwarding, routing, types of routing, routing tables, Unicast Routing, Unicast Routing protocols, RIP, Concepts of OSPF, BGP & Multicast Routing

### Unit III

**Transport Layer:** Process to process delivery, UDP, TCP.  
**Congestion Control & Quality of Service:** Data traffic, Congestion, Congestion Control (Open Loop, Closed Loop & Congestion control in TCP), QoS and Flow Characteristics.

**Application Layer:** DNS, Remote Logging(Telnet), SMTP, FTP, WWW, HTTP

### Reference:

- 1) Data Communication & Networking (Forouzan) , Tata McGraw-Hill Education



**Additional Reference:**

- 1) Computer Networks and Internets - Douglas Comer, Prentice Hall
- 2) Computer Networks - Andrew Tanenbaum, Prentice Hall

*K. S. Kulkarni*  
HC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



1. SU-02 B.Sc. Computer Science Sem.- V & VI



**Course: B.Sc.(C.S.)**

**Semester : V**

**Topic: Pr. Based on Adv. Java**

**Paper No.: CS509P (A)**

Minimum 10 Practicals to be performed as per the guidelines of teaching Faculty depending upon all theory units of concerned subject.

**Course: B.Sc.(C.S.)**

**Semester : V**

**Topic: Pr. Based on Computer Graphics**

**Paper No.:**

**CS509P (B)**

Minimum 10 Practicals to be performed as per the guidelines of teaching Faculty depending upon all theory units of concerned subject.

**Course: B.Sc.(C.S.)**

**Semester : V**

**Topic: Pr. Based on Android O.S.**

**Paper No.: CS510P (A)**

Minimum 10 Practicals to be performed as per the guidelines of teaching Faculty depending upon all theory units of concerned subject.

**Course: B.Sc.(C.S.)**

**Semester : V**

**Topic: Pr. Based on PHP/ASP.Net**

**Paper No.: CS510P (B)**

Minimum 10 Practicals to be performed as per the guidelines of teaching Faculty depending upon all theory units of concerned subject.

Co-ordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.

*K. K. Kulkarni*  
VC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



# B.Sc.(Computer Science) Semester - VI

*Kwajmare*  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

**Course: B.Sc.(C.S.) – VI Seme**      **Paper Code: CS-601**  
**Software Quality and Testing**

**Unit-I**

**Quality Concepts**

Software and Quality, Garvin's Quality Dimensions, McCall's Quality Factors, ISO 9126 Quality Factors, Risk, Quality and Security, SE Methods, Project Management Techniques, Quality Control and Assurance

**Quality Assurance**

Elements of Software Quality Assurance, SQA Task Goals and Matrices, Formal Approach to SQA, Six Sigma for SE, ISO 9000 Quality Standards, SQA Plan.

**Unit-II**

**Software Testing Strategies**

Verification and Validation, Picture of Software Testing Strategies, Criteria for compilation of testing, Strategies issue, Strategies for Conventional Software and Web Apps, Validation Testing, System Testing, Debugging.

**Unit-III**

**Testing Conventional Applications**

Testing Fundamentals, Internal and External view, White-Box Testing, Basic Path Testing, Control Structure Testing, Black-Box Testing, Testing Client-Server Architecture.

**Testing Web Applications**

Dimensions of Quality, Errors within a Web App, Testing Strategy and planning, Testing process, Content Testing, Database Testing, User Interface Testing, Navigation Testing, Configuration Testing, Load Testing, Stress Testing.

**Reference Books:**

1. Software Engineering a Practitioner's Approach By Roger S. Pressman (Seventh Edition) McGraw Hill.
2. An Integrated Approach to Software Engineering, Pankaj Jalote, Narosa.

*Pankaj Jalote*  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



**Course: B.Sc.(C.S.) – VI Seme**

**Paper Code: CS-602**

### **Android Application Development**

#### **Unit I:**

##### **Android SDK Features**

Access to Hardware including Camera, GPS, and Accelerometer, Native Google Maps, Geocoding, and Location-Based Services, Background Services, SQLite Database for Data Storage and Retrieval, Shared Data and Interapplication Communication, P2P Services with Google Talk, Extensive Media Support and 2D/3D Graphics, Optimized Memory and Process Management, The Dalvik Virtual Machine, Advanced Android Libraries.

##### **Android Development Tools**

Types of Android Applications, Hardware-Imposed Design Considerations, Users, Environment, The Android Emulator, Dalvik Debug Monitor Service (DDMS), The Android Debug Bridge (ADB).

#### **Unit II:**

##### **Applications and Activities:**

Application Manifest, Manifest Editor, Android Application Life Cycle, Understanding Application Priority and Process States, Externalizing Resources, Fundamental Android

**UI Design:** The Android Widget Toolbox, Layouts, Compound Controls, Custom

Widgets and Controls, Android Menu System, Activity Menu, Intents, Broadcast Receivers, Adapters, and the Internet: Intents to Launch Activities, Intent Filters to Service Implicit Intents, Intent Filters for Plug-ins and Extensibility, Intents to Broadcast Events, Android-Supplied Adapters, Internet Resource.

##### **Data Storage, Retrieval, and Sharing**

Creating and Saving Preferences, Retrieving Shared Preferences, Saving the Activity State, File Management Tools, Databases in Android: SQLite, Cursors and Content Values, Content Providers.  
Maps, Geocoding, and Location-Based Services: Location Providers, Geocoder, Map-Based Activities.

#### **Unit III:**

##### **Advanced Development in Android:**

*K. K. Kulkarni*  
I/C Principal

Modern College of Computer Science & I.T.,

1. SU-02 B.Sc. Computer Science Sem.- V & VI

Controlling Services, Threads, Customizing Toasts, Toasts in Worker  
Threads, Notification Manager, Triggering Notifications. Peer-to-Peer  
Communication: Android Instant Messaging, Sending & Listening SMS.  
Accessing Android Hardware: Media APIs, Controlling Camera Settings,  
Sensor Manager, Accelerometer and Compass, Android Telephony,  
Bluetooth, Managing Network and Wi-Fi Connections. Advanced Android  
Development: Paranoid Android, AIDL to Support IPC for Services, Internet  
Services, Rich User Interfaces.

**Books & References:**

- 1) Android Tutorial, Simply Easy Learning by tutorialspoint.com.  
Link:[http://www.tutorialspoint.com/android/android\\_tutorial.pdf](http://www.tutorialspoint.com/android/android_tutorial.pdf)
- 2) Professional Android 4 Application Development :Retomeier, Wrox publication.
- 3) Android Apps for Absolute beginners : Wallace Jadsen, Apress.
- 4) The Complete Android Guide: Kevin Purdy

Javapoint Tutorial : <http://www.javapoint.com/android-tutorial>



*K. Prasad*  
J/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



Course: B.Sc.(C.S.) – VI Seme

Paper Code: CS-

603

## Theory of Computation

### Unit-I

**Introduction:** Sets, relations, functions, graphs, trees, mathematical induction.

**Regular expressions:** FA and regular expression, pumping lemma for regular sets, applications of pumping lemma, closure properties of regular sets, regular sets and grammar, types of grammar (type 0, type 1, type 2, type 3)

### Unit-II

**Finite automata:** definition, transition systems, acceptability of strings, NFA, DFA, equivalence of DFA and NFA, relay moore model, minimization of automaton, Applications.

### Unit-III

Formal Languages, Chomsky classification of languages, languages, their relation and automaton.

### Reference Books

1. J E Hopcroft, R Motwani and J D Ullman, Introduction to Automata theory, Languages and Computation, Pearson Education Asia, 2003.
2. Daniel A Cohen, Introduction to Computer Theory, Hardcover (1990) by. John Wiley & Sons
3. K. L P Mishra, N Chandrashekharan, Theory of Computer Science, PHI 2001
4. Martin John C, Introduction to Language ad Theory of computations (TMH) 2004

*K. S. Ghosh*

IIC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



**Course: B.Sc.(C.S.) – VI Seme**

**Paper Code: CS-604**

### **Advanced Computer Graphics**

#### **Unit-I**

##### **3-D Transformation**

Translation, Scaling, Rotation, Shearing, Reflection, Multiple Transformation Projection, Perspective Projection, Parallel Projection, Types of Parallel & Perspective Projection, Vanishing Points. Diffuse Illumination, Specular Reflection.

#### **Unit-II**

##### **Curves and Fractals**

Curve Generation, Representation of Parametric & Non-Parametric Curves, Spline Representation Parametric Representation of Circle & Ellipse, Bezier curves, B-Spline curves Fractals, classification of fractals, Topological Dimension, fractal Dimension, Hilbert's curves, Koch curve.

#### **Unit-III**

##### **Colour Model and Animation**

Properties of Light, CIE Chromaticity Diagram, Colour Primary Systems, Color Matching Experiments, Colour Models: RGB, CMY and HSV. Introduction of Animation, Animation Using Colour Table, Animation of Wireframe Models.

#### **Text Books:**

1. Procedural Elements for Computer Graphics: D.F.Rogers
2. Mathematical Elements for Computer Graphics: D.F.Rogers and J.A.Adams
3. Computer Graphics by M. Pauline Baker, Donald Hearn, (2nd Edition) PHI Publication

#### **Reference Books:**

1. Computer Graphics: A.P.Godse, (IIInd Edition), Technical Publication
2. Principles of Interactive Computer Graphics By. William. M. Newman. (IInd Edition) Mc.Graw Hill Publication.
3. Computer Graphics by V.K. Pachghare, (II nd Edition), Laxmi Publication



*Handwritten signature*

**I/C Principal**

Modern College of Computer Science & I.T.,  
Aurangabad.

Course: B.Sc.(C.S.) – VI Seme

Paper Code: CS-605

### Advanced Programming with PHP

**Unit-I:** Handling HTML Forms in PHP: Creating HTML Form, Capture Data Sent,

Handling: Empty form data, Multi-Value fields, Validating Form Data, Difference between GET and POST, Global and Environment Variables, Generating Web-form in PHP, Create Multi-step Form, Hidden fields, Redirecting the user.

**Unit – II:** Cookies and user sessions in PHP: State and Stateless Webpage, Cookies: Anatomy of cookies, Setting a cookies with PHP,

Deleting a

cookies, Creating Session Cookies,

QueryString: Working with QueryString, Creating QueryString.

Session: Using PHP Session to Store Data: Creating a Session, Reading & Writing Session Data, Destroying a Session, Create a User Login System.

**Unit – III:** Introducing Database and SQL: Basics of MySQL, Connecting to the Database Server, Creating Database, Creating Table.

Retrieving data: Limit the number of results returned, Order and group results, Query multiple tables at once, Use various MySQL functions and other features to build more flexible queries  
Manipulating data from SQL with PHP: Inserting new records into tables using INSERT statements, changing field values within records with UPDATE statements, deleting records using DELETE statements.

#### Reference Books:

- 1) **Beginning PHP 5.3** , Author: Matt Doyle, Wiley Publishing, Inc.
- 2) **SAMS Teach yourself PHP in 24 hours**, Author: Matt Zandstra, Sams Publishing.
- 3) **"PHP, MySQL and Apache All in One"** , Author: Julien C. Meloni, SAMS series

*K. K. K. K.*  
IIC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.





**Course: B.Sc.(C.S.) – VI Seme**

**Paper Code: CS-606**

**Programming Language: C Sharp**

**UNIT I :**

Introduction : Basic Concepts, Features, Common Language Specification

C# Types: Simple type, Struct type, Object type Class type, Interfaces, String type, Arrays , Boxing & unboxing Conversions , Implicits , Explicit , Standard & User Defined Conversions.

**UNIT II :**

Control Statements : Selection Statements – if , Switch, Iteration Statements – For, For-Each, While, Do statements.

Classes & Methods : Constructors & Destructors ,Methods-Parameters, Overriding, Hiding class properties , Indexes , Modifiers, Class member Access, Multi cast delegates

Inheritance & Polymorphism : Inheritance- Basic class & Derived Class , Polymorphism , Base class with Virtual method, Derived class with override methods

**UNIT III :**

Interfaces: Base, body, members , methods , properties , events, indexes, mapping, implementation  
Exception Handling : Checked & Unchecked statements, compiler settings for overflow checking , Programmatic overflow checking , Exception handling statements – try & catch , try & finally , try- catch- finally, throwing exception & rethrowing exception

**Reference Books :**

1. C# : A Beginners Guide – Childt , Herbert ( Tata Megraw Hill , New Delhi )
2. C# The basics, Vijay Mukhi ( BPB Publications)
3. C# Programming ( Wrox Publications)
4. C# Programming Black Book – Matt Telles (DreamTech Publications)

*K. K. Kulkarni*  
H/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



**Course: B.Sc.(C.S.) – VI Seme Paper Code: CS-607**

**E-Commerce**

**Unit-I**

Introduction, IT and business, E-commerce: Concepts Electronic Communication, PCs and Networking, E-mail, Internet and intranets. EDI to E-commerce, EDI, UN/EDIFACT

**Unit-II**

Concerns for E-commerce Growth, Internet bandwidth, Technical issues, Security issues. India E-commerce Readiness, Legal issues, Getting started.  
Security Technologies: Encryption, Symmetric key Encryption, Public key encryption, Public key encryption using digital Signatures. Hashing techniques, Certification and key Distribution, Cryptographic.

**Unit-III**

The elements of E-commerce. SSL-Secure Socket Layer, SET-Secure Electronic Transaction Protocol for Credit card payment, E-Cash, E-check, Smart cards.  
Electronic Payment System: Digital Cash, Digital Wallets, Digital checking payment systems, Electronic Billing, Wireless payment systems.  
Software Package: PGP e-mail encryption software

**Textbook:**

1. E-Commerce: The Cutting Edge of Business, Kamlesh K. Bajaj & Debjani Nag, Tata McGraw Hill.
2. E- Commerce Strategy , Technologies and Applications, David Whiteley, McGraw Hill Edition

**Reference Books:**

1. E- Security, Electronic Authentication and Information Systems Security Sundeep Oberoi, TMG
2. E-Commerce Concepts, Models , Strategies by - G.S.V Murthy
3. E-Commerce- Kenneth C.Laudon and Carol Guercio Traver
4. Internet marketing and E-commerce-Ward Hanson and Kirthi Kalyanam

*K. S. Kalyanam*  
HC Principal





1. SU-02 B.Sc. Computer Science Sem.- V & VI

**Paper Code: CS-608**

**Course: B.Sc.(C.S.) – VI Seme**

**Ehtics & Cyber Law**

### **Unit-I**

Basic Concepts of Technology and Law, Understanding the Technology of Internet, Scope of Cyber Laws, Cyber Jurisprudence. Law of Digital Contracts The Essence of Digital Contracts.

### **Unit-II**

The System of Digital Signatures. The Role and Function of Certifying Authorities. The Science of Cryptography, E-Governance, Cyber Crimes and Cyber Laws. Introduction to Intellectual Property.

### **Unit-III**

Information Technology Act 2000 Cyber Law  
Issues in E-Business Management. Major issues in Cyber Evidence Management, Cyber Law Compliancy Audit, The Ethics of Computer Security. Relevant Rules Notifications, Information Technology (Amendment) Act, 2008.

### **Text books:**

1. Godbole, "Information Systems Security", Wiley
2. Merkov, Breithaupt, "Information Security", Pearson Education
3. Yadav, "Foundations of Information Technology", New Age, Delhi
4. Schou, Shoemaker, "Information Assurance for the Enterprise", Tata McGraw Hill
5. Sood, "Cyber Laws Simplified", Mc Graw Hill
6. Furnell, "Computer Insecurity", Springer

*K. M. M. M. M.*  
HIC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

Dr. Babasaheb Ambedkar Marathwada University  
Aurangabad- 431004( MS) India




Three Year Undergraduate Bachelor Degree Program  
In Science and Technology

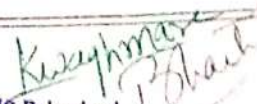
B. Sc. (Computer Science)

Curriculum Structure and Scheme of  
Examination

Choice Based Credit System  
(Effective from Academic Year 2022-23)

Dr. Babasaheb Ambedkar Marathwada University  
Aurangabad – 431004 (MS) India

  
Dean  
Faculty of Science & Technology  
Dr. Babasaheb Ambedkar Marathwada  
University, Aurangabad

  
I/C Principal  
Modern College of Computer Science & IT,  
Aurangabad.  
Page 1 of 25



# B.Sc. (Computer Science)

## Semester - I

B. Sc. Comp. Sci.

*K. Jayaram*  
V/C Principal  
Modern College of Computer Science & I.T.  
Aurangabad.  
Page 7 of 25



# Curriculum for semester I



Coursecode:CS-111 T Course Title:Computer Fundamentals

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

## Prerequisites:

There are no prerequisites required for attending this course.

## Learning objects

To impart basic introduction to computer hardware, components, computer number system. How the CPU works, fundamental about algorithms and flowchart as well as different types of software.

## Learning outcomes

- Students who complete this course successfully will acquire:
- Knowledge of computer fundamental, CPU and its functionalities.
- Understanding of block diagram of hardware peripherals.
- Understanding the concepts of software and its types.
- Understanding the number of system and its conversion between different numbers of systems.
- Understanding the computer based application such as email and video conferencing.

## Course Outline

### UNIT – I

#### 1. Fundamentals of Computer System

- Characteristics & features of Computers.
- Components of Computers.
- Organization of Computer.

#### 2. Computer Generation & Classification

- Generation of Computers : First to Fifth
- Classification of Computers : Distributed & Parallel computers

### UNIT – II.

#### 3. Computer Memory

- Memory Cell & Organization
- Types of Memory (Primary And Secondary) : RAM , ROM , PROM , EPROM, advantages and disadvantages of each.
- Secondary Storage Devices ( FD, CD, HD, Pen drive, DVD, Tape Drive, DAT )

4. I/O Devices
- Input Devices : Touch screen , OMR, OBR , OCR, Light pen, Scanners
  - Output Devices: Digitizers, Plotters, LCD, Plasma Display, Printers

**UNIT - III**

5. Processor

- Structure of Instruction , Description of Processor , Processor Features
- RISC & CISC

**UNIT - IV**

6. Internet, World Wide Web:

Introduction to Internet, Internet Access, Internet Basics, Protocols-TCP/IP, HTTP, FTP, Addressing, World Wide Web (WWW), Web Pages & HTML, Web browsers, Searching for information-search engines, Internet chat, Applications of Internet, Advantages and Disadvantages of Internet.

**UNIT - V Test and Tutorial**

**Text Books:**

1. Fundamentals of Information Technology; By Chetan Srivastava, Kalyani Publishers
2. Fundamentals of Computers: By V. Rajaraman, PHI Publication , IVth Edition.
3. Fundamentals of Programming: By Raj K. Jain, S. Chand Publication

**Reference Books:**

1. Computer Fundamental By B. Ram, BPB Publication.

Course code : CS-112 T Course Title : Digital Electronics

Total Credit: 2

Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)



### UNIT - 1

#### 1. Number Systems and Arithmetic

- Number System : Decimal , Octal , Hexadecimal & Binary Number System
- Conversion within Binary, Octal, Hexadecimal & Decimal Number System.
- Binary Arithmetic : Binary addition, subtraction, multiplication & division
- Binary subtraction using 1' complement, 2's complement method.
- Hexadecimal arithmetic: Addition, subtraction, multiplication & division

#### 2. Boolean Algebra and Logic Gates

- Postulates of Boolean Algebra
- Theorems of Boolean Algebra: Complementation , commutative, AND, OR, Associative, Distributive, Absorption laws , De morgan's theorems
- Reducing Boolean expressions
- Logic Gates : AND, OR, NOT, Ex-OR, Ex-NOR
- NAND as Universal building block
- Logic diagrams of Boolean expressions Boolean expressions for logic diagrams

### Unit - II

#### 3. Minimization Techniques

- Introduction , Minterms and Maxterms
- K-Map, K-map for 2 variables
- K-map for 3 variables
- K-map for 4 variables

#### 4. Combinational and Arithmetic Logic Circuits

- Half Adder & Full Adder
- Binary parallel Adder
- Half Subtractor, Full Subtractor
- Adder/Subtractor in 2's complement system
- BCD to Decimal decoder
- 2 : 4 demultiplexer
- 4 line to 1 line multiplexer

### Unit - III

#### 5. FlipFlops

- Introduction : RS FF
- Clocked RS FF, D FF
- Triggering, preset and clear
- JK FF , T FF , Race around condition
- Master slave FF



6. Counters

- Introduction : Asynchronous/ ripple counter
- Modulus Counter, MOD-12 counter
- Synchronous counter : Synchronous serial & synch parallel counter
- BCD counter
- Ring counter

UNIT - V Test and Tutorial

7. Shift Registers

- Introduction, Buffer register
- Serial-in serial-out Serial-in parallel-out
- Parallel-in serial-out, parallel-in parallel-out

UNIT - V Test and Tutorial

Text Book:

1. Digital Electronics and Micro-Computers - R.K. Gaur, Dhanpat Rai Publication

Reference Book:

1. Digital Electronics and Logic Design - N.G. Palan, Technova Publication



Course Code : CS-113 T

Course Title : Operating System I

Total Credit: 2      Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)



### Prerequisites:

There are no prerequisites for attending this course.

### Learning Objectives

- To introduce students the basic functioning of operating systems as resource manager and its salient features.
- To acquaint students about Process States, CPU Scheduling, Inter Process Communication, Synchronization, Deadlocks.

### Learning Outcomes

Upon successful completion of the course, the students will:

- Gain knowledge of System Software, Program and Process.
- Understand Types of Operating System, Basic functions of O.S. and Evolution of O.S.
- Understand the concept of Process, Process Control Block and Threads.
- Understand the CPU scheduling Non-Pre-emptive and Pre-emptive Scheduling algorithms
- Understand the concept of Synchronization and Deadlock.

### Course Outline

#### Unit I: Introduction to Operating System:

**Introduction to Software:** Definition, Classification of software, Operating system as the main component of system software, Program and Process.

**Operating System Fundamental :** O.S. as a resource manager, Structure of O.S., Types of O.S.- Single user and multiuser O.S., Basic functions of O.S., Characteristics of modern O.S. **Evolution of O.S. :** Early systems, Simple batch systems, Multiprogramming batch systems, Time sharing system, Operating system for Personal Computers, workstations and Hand held devices, Parallel systems, Distributed systems, Real time systems, Advantages and Disadvantages of each system.

#### Unit II: Process Management:

**Concept of Process:** Process States, Process Control Block, Operations on Processes, Threads.

**CPU Scheduling:** Types of schedulers, Criteria for scheduling, Non-Pre-emptive Scheduling Algorithms – First-come First-served Scheduling and Shortest Job First Scheduling, Pre-emptive Scheduling Algorithms- Priority Scheduling, Round Robin.

#### Unit III: Inter Process Communication and Synchronization:

*K. V. Ghoshmare*

HC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

Concurrent and dependent process, need for synchronization, introduction of Critical Section and Semaphores, method of inter process communication, process synchronization, synchronization problem.

#### UNIT - IV

Deadlocks :Concept of Deadlock, Deadlock Modeling, Methods for Handling Deadlock, Memory management.

#### UNIT - V Test and Tutorial

#### Reference Books:

1. "Operating System", By S.R. Sathe & Anil S. Mokhade, MacMillan Publication.
2. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications 2008.
3. A.S. Tanenbaum, Modern Operating System, 3rd Edition, Pearson Education 2007.
4. G. Nutt, Operating System: A Modern Perspective, 2nd Edition Pearson Edition 1997.
5. W. Stallings, Operating Systems, Internals & Design Principles 2008 5th Edition, Prentice Hall of India.
6. M. Milenkovic, Operating Systems- Concepts and design. Tata McGraw Hill 1992.



Course code: CS-114 T

Course Title: Programming in C

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)



#### UNIT – I

##### 1. Introduction:

- An Overview of C , History of C language, C as a Structured Language. Features of C.

##### 2. Basic Elements & Operators

- Character set, C Token, Identifier & Keywords, Variables
- Constant and its types. Integer constant, floating point constant, character constant, string constants.
- Operators: Arithmetic, Relational, Logical, Unary operators: Increment & decrement Assignment and Conditional operator.
- Precedence & Associativity of Operators

##### 3. Data Types

- Data Types: *int, char, float, double*. Declaration & Initialization.
- Type modifier: long, short, signed & unsigned

#### UNIT – II

##### 4. C Program & I/O statements

- Structure of C Program, Compilation & Execution of C program
- I/O: Introduction. Formatted Input/Output function: *scanf & printf*. Escape sequence characters.
- Library functions: General & Maths.

#### UNIT – III

##### 5. Control and Iterative Statements:

- Simple if, nested if, if-else, else if ladder
- Switch-case statement
- The conditional expression (? : operator)
- while and do-while loop, and for loop
- break & continue statement, goto statement

#### UNIT – IV

##### 6. Arrays:

- Introduction, Declaration and initialization Accessing array elements, Memory representation of array.
- One dimension and multidimensional arrays, character array, Introduction to string.

#### UNIT – V Test and Tutorial

#### Text Books::

1. Let us C : Y.P. Kanetkar [bpb publication]
2. Programming in C : E. Balaburuswamy [Tata macgraw hill]

B. Sc. Comp. Sci.

Page 14 of 25  
Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



3. Programming in C : Goterfried [Shaums' Series]

**Reference Books:**

1. Spirit of C : Moolish Kooper.



**Course code : CS-115 T Course Title : Mathematical Foundation**

Total Credit: 2

Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

**Prerequisites:**

Basic understanding of mathematical concepts (School or Junior College).

**Learning Objectives**

To expose the students to the following:

- Propositional function, statements, well-formed formulas.
- Set theory concepts like Finite Set, Subset, Empty Set and operations on set.
- Matrices and its various types.
- Binary relations, posets, Functions, and pigeonhole principle.
- Algebraic structures like groups and elementary combinatorics.
- Various concepts in graphs and trees like its representation and its types.

**Learning Outcomes**

After successful completion of course the student should be able to

- Know how to represent various statements using set, relations, functions, permutations and combinations, groups, graphs and trees
- Use logical notations to formulate and reason about fundamental mathematical concepts such as sets, relations, functions and algebraic structures.
- Analyse the growth of functions and real-world problems using various concepts like recurrence relations, graph implementation etc.
- Apply mathematical logic to solve problems, pigeonhole principle to solve real time problems,
- Model and solve real world problems using graphs and trees.

**Course Outline**

**Unit I: Mathematical Logic:**

Propositional Calculus: Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Normal Forms.

**Set Theory:**

Types of Set: Finite, Infinite, Singleton, Empty, Subset, Proper Subset, Universal Set, Power Set, Venn Diagram, Operations on Set: Union of Sets, Intersection of Sets, Complement of Set, Cartesian Product, Difference and Symmetric Difference of Set.

**Introduction to Matrices:** Types of Matrices, Matrix, Operations, Adjoint and Inverse of a Matrix, Rank of a Matrix and Special Matrices.

**Unit II Combination:**

B. Sc. Comp. Sci.

*K. Jaghanna*  
H.C. Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

Review of Permutation and Combination, Mathematical Induction - Pigeon hole principle,  
Principle of Inclusion and Exclusion, generating function, Recurrence relations



### Unit III: Basics of Graph Theory and Trees

Introduction to Graph, Application of Graph, Finite and Infinite Graph, Incidence and Degree, Null Graph, Isolated and Pendant Vertex, Isomorphism, Subgraph, Walks, Path and Circuit, Union and Intersection Operation, Graph, Planner Graph, Trees, Pendant Vertices on Tree, Binary Tree, Spanning Tree.

### UNIT - IV

#### Relation:

Basic definitions of Relation and types of Relations, Graph of Relations, Properties of Binary Relations, Matrix Representation of Relations, Operations on Relations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering Relations.

### UNIT - V Test and Tutorial

#### Text Books:

1. Elements of Discrete Mathematics-A Computer Oriented Approach C. I. Liu, D.P. Mohapatra, 3rd edition Tata McGraw Hill.
2. Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and P. Manohar, Tata McGraw Hill
3. Foundations of Computer Science, A. Aho and J. Ullman- W. H. Freeman, 1982.
4. Discrete Mathematics-Dr. Bembalkar

#### Reference Books:

1. Discrete Mathematics for Computer Scientists and Mathematicians, J. L. Mott, A. Kandel, T.P. Baker, 2nd Edition, Prentice Hall of India.
2. Discrete Mathematical Structures, Bernard Kolman, Robert C. Busby, Sharon Cutler Ross, Pearson Education/PHI.
3. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H. Rosen, 7th Edition, Tata McGraw Hill.

Course code : CS-106 T Course Title : Programming Methodology

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)



#### Prerequisites:

There are no prerequisites for attending this course.

#### Learning Objectives

- Learn to develop simple algorithms and flow charts to solve a problem.
- Develop problem solving skills coupled with top-down design principles.
- Learn about the strategies of writing efficient and well-structured computer algorithms/programs.
- Develop the skills for formulating iterative solutions to a problem.

#### Learning Outcomes

- Learn the History and types of Programming.
- Learn various approach of writing program.
- Learn to develop simple algorithms and flow charts to solve a problem.

#### Unit I Introduction to Programming Environment

Introduction to Programming, Definition of program and programmer, features of good programming language, Bugs and Debugging.

#### Programming Techniques

Programming approaches: Types of programming methodologies, Procedural Programming, Functional Programming, Structural Programming, Modular Designing, Logical Programming -Top Down Designing, Bottom Up Designing, Object Oriented Programming

#### Unit II Programming Languages

History of languages, Classification of computer language: Types of Programming Languages- Machine Languages , Assembly Languages, High Level Languages, low level language, Structure Language, Object oriented Language, Modular techniques, Modular Programming - advantages, identifying the modules, step-by-step solution, control structures, decision control structures, selection control structures, loop control structures, 4GL, Assembler, Linker, Loader, Interpreter & Compiler, TASM, Debug

#### Unit III Algorithm

Definition, Characteristics , Advantages and disadvantages, Pseudocode or Structured English, Algorithm, basic features and properties of algorithm.

B. Sc. Comp. Sci.

Page 27 of 28 of  
Modern College of Computer Science & I.T.,  
Aurangabad.



## UNIT - IV

### Flow-Chart

Definition, Principles of flowcharting, Flowcharting symbols, Data flow diagram, pseudocode, converting algorithms to flowcharts, problem solving through algorithm and flowchart. Advantages and disadvantages.

## UNIT - V Test and Tutorial

### Books :

1. Fundamentals of Computer V. Rajaraman
2. Programming Logic and Design, Comprehensive By Joyce Farrell
3. Problem Solving and Program Design in C, J. R. Hanly and E. B. Koffman, Pearson, 2015.



Course code : CS-131 T Course Title : English Communication Skill  
(linguistic approach)

Total Credit: 3 Marks: 50 (UA: 40 + IA: 10)

Periods: 5 per week (50 Minutes each)



#### Prerequisites:

There are no prerequisites for attending this course.

#### Learning Objectives

- Learn fundamentals of Parts of Speech.
- Detailed study of Spellings, Silent letters and Articles.
- Learn Auxiliary verbs, Subject and Object and how to make Questions and Question tags.
- Addressing the Greetings and giving directions.
- To enhance the vocabulary-building, word formation, Synonyms & Antonyms, One-word substitutes and Phrasal verbs.
- To improve listening, oral and reading skills

#### Learning Outcomes

Upon successful completion of the course, the students will be able to:

- Understand the different styles of communication.
- Understand the effective speaking skills and develops effective reading comprehensions.
- Understand how to write a good personal profile and improve one's presentation skills.
- Develop good writing skills.

#### Course Outline

##### Unit I: Basics of Communication Skill:

**Communication Skills:** Introduction, Definition, Nature and Scope of Communication, an Importance and Purpose of Communication, 'C's of good communication, Process of Communication. **Barriers to communication:** Physiological Barriers, Physical Barriers, Cultural Barriers, Language Barriers, Gender Barriers, Interpersonal Barriers, Psychological Barriers, Emotional barriers. **Communication Network in Organization:** Personal Communication, Internal Operational Communication, External Operational Communication, Horizontal (Lateral) Communication, Vertical (Downward) Communication, Vertical (Upward) Communication.

##### English Grammar:

**Parts of Speech:** Nouns, Pronouns, Verbs, Adverbs, Adjectives, Conjunctions, Prepositions, Interjections. Using the **Dictionary:** Primary Auxiliaries, Modal Auxiliaries, Subject and Object (Direct/Indirect), Yes or No Questions, Wh-word Questions, Question Tags. **Grammar:** Type of Verbs, Subject- Verb Agreement, Tense (present and past) and Aspect, several possibilities for denoting future Time, vocabulary building, constructing paragraphs



## Unit II: Elements of Communication & Listening Skills:

**Elements of Communication:** Introduction, Face to Face Communication – Tone of voice, Body Language (Non-Verbal Communication), Verbal Communication, Physical Communication. **Listening Skills-I:** Introduction, Listening to Conversation (Formal and Informal), Active Listening, Benefits of Listening Skill, Barriers to Listening, Listening to Announcements (Railway stations/Bus stations/ Airports/ Sports Announcements/ Commentaries etc.) **Listening Skills-II:** Academic Listening (Listening to Lectures), Listening to Talks and Presentations, Note Taking Tips.

## UNIT – III Oral Communication Skills:

Importance of Spoken English, Status of Spoken English in India, International Phonetic Alphabet (IPA) Symbols, Spelling and Pronunciation, Requesting and responding to requests, Congratulating people on their success, Expressing condolences, Apologizing and forgiving, Giving instructions, Seeking and giving permission, Expressing Opinions (likes and dislikes), Demanding Explanations, Asking for and giving advice and suggestions. **Reading Skills:** Purpose, Process, Methodologies, Skimming and Scanning, Levels of Reading, Reading Comprehension.

## Unit IV: Effective Writing Skills:

Elements of Effective Writing, Sentences, Phrases and Clauses, Types of Sentences, Main Forms of Written Communication, Paragraph Writing (Linkage and Cohesion), Letter Writing (Formal and Informal), Essay Writing, Notices, Summarizing, Precise Writing, Note-Making, Amount of Discussion Required Understanding and Applying Vocabulary: Words Often Confused-Pairs of words, One Word Substitutes, Synonyms and Antonyms, Word Formation: Prefixes, Bases and Suffixes (Derivational & Inflectional).

## UNIT – V Test and Tutorial

### Reference Books:

1. **Basic communication skills for Technology**, Andreja. J. Ruther Ford, 2nd Edition, Pearson Education, 2011
2. **Communication skills**, Sanjay Kumar, Pushpalata, 1st Edition, Oxford Press, 2011
3. **Organizational Behaviour**, Stephen.P. Robbins, 1st Edition, Pearson, 2013
4. **Brilliant- Communication skills**, Gill Hasson, 1st Edition, Pearson Life, 2011
5. **Business Communication**, By Urmila Rai & S.M. Rai, Himalaya Pub
6. **Business Communication** Anjali Ghanekar
7. **Anderson, Kenneth**. Joan Maclean and Tony Lynch. Study Speaking: A Course in Spoken English for Academic Purposes. Cambridge: CUP, 2004.

*Kaushik*

I/C Principal  
Modern College of Computer Science & I.T.  
Aurangabad.

Page 20 of 25

Dr. Babasaheb Ambedkar Marathwada University  
Aurangabad- 431004 (MS) India



Three Year Undergraduate Bachelor Degree Program  
In Science and Technology

B. Sc. (Computer Science)

Curriculum Structure and Scheme of  
Examination

Choice Based Credit System

(Effective from Academic Year 2022-23)

Dr. Babasaheb Ambedkar Marathwada University  
Aurangabad – 431004 (MS) India

*Bhakt.*  
19/1/23

*[Signature]*  
19/1/23  
Faculty of Science & Technology  
Dr. Babasaheb Ambedkar Marathwada  
University, Aurangabad

*[Signature]*  
IC Principal  
Modern College of Science & IT,



Course code: CS-211 F Course Title: Data Structures

Total Credit: 2 Marks: 50 (TA: 40 + IA: 10)

Periods: 3 per week (30 Minutes each)



### Prerequisites:

Basic understanding of C programs & arrays, hands on experience in decision making and looping constructs of C programming language will be a huge benefit.

### Learning Objectives

- To provide fundamental knowledge of data structures and how they are organized/arranged in computer memory.
- To provide knowledge on how data structures are implemented and processed.
- To familiarize with basic techniques of algorithm analysis.
- To equip with the implementation techniques of complex algorithms of insertion, deletion and modification of data stored in various data structures.
- To provide knowledge of the basic functioning of searching and sorting algorithms.

### Learning Outcomes

Students who complete this course successfully will acquire:

- Ability to understand fundamental data structures like arrays, linked-lists, stack, queues, trees, graphs.
- Ability to understand abstract data types.
- Ability to program data structures and use them in implementations of abstract data types.
- Understanding of basic algorithmic complexity.
- Ability to sensibly select appropriate data structures and algorithms for problems and to justify that choice.
- Ability to understand searching and sorting algorithms, their implementation and suitable applications.

### Course Outline

#### Unit I: Data Structures & Algorithm Analysis:

Data Structures: Introduction to linear and non-linear data structures. Algorithm Analysis: Growth rates, Estimating the growth rate, Big O notation.

#### Unit II: Arrays:

Need for Arrays, Linear Arrays, representation of linear arrays (row-major order, column-major order), Traversing, insertion, modification, deletion in linear array, merging linear arrays. 2-dimensional arrays introduction, representation of 2-dimensional array, sparse matrices.

#### Unit III Searching & Sorting:

Need for Searching and sorting, Linear search, binary search, bubble sort, selection sort, insertion sort.

*Keynotes*

*Dr. Amir Dilger*



#### Unit IV: Stack & Queue:

Introduction, Operations on stack, stack implementation using arrays., Applications of Stack (Expression representation and evaluation), Expression notations (prefix, infix, postfix), Conversion of expression (prefix to infix, infix to postfix). **Queue:** Introduction, Types of queues (Circular Queue, Dequeue), Queue Implementation using arrays, Operations on Queue (Traversing, Insertion, deletion, and modification), Application of Queue (priority queue).

#### Unit V: Test & Tutorials

#### Reference Books:

1. Data Structures using C, by Seema Threja, 2<sup>nd</sup> Edition, Oxford Press.
2. Lipschutz: Schaum's outline series Data structures Tata McGraw-Hill

#### E-Books:

1. Fundamentals of Data Structures in C, by Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed
2. Design & Analysis of computer Algorithms by Alfred Aho, John Hopcroft and Jeffery Ullman ([Link](#))
3. Introduction to Algorithms by Thomas Corman et.al ([Link](#))

*Kwashi*

I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

Course Code: CS-212T

Course Title: 8086 Microprocessor

Total Credit: 2

Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)



### Prerequisites:

Course CS-112T Digital Electronics.

### Learning Objectives

- To get knowledge of internal architecture of 8086 microprocessor
- Understand different addressing modes.
- Learn assembly language instructions to construct an ALP.

### Learning Outcomes

Upon successful completion of the course, the students will be able to:

- Functional block diagram of 8086 microprocessor
- Functions of each pin of 8086 microprocessor
- Use of instructions in different addressing modes
- Write an assembly language program.

### UNIT – I

#### Introduction to Microprocessor and Microcomputer:

Microprocessor based personal computers system.

Block diagram of microprocessor based computer system.

Modern computer memory map, I/O Space.

The Microprocessor, buses.

Computer Data formats, ASCII Unicode, BCD.

### UNIT – II

#### Microprocessor and its architecture:

8086 internal architecture.

Real Mode & Protected Mode Memory Addressing.

Memory Paging.

Pinout and Pin function of 8086 microprocessor.

### UNIT – III

#### Addressing Modes:

Data addressing modes.

Program memory addressing modes.

Stack memory addressing modes.

### UNIT – IV

#### MOV revisited:

Machine language. The op-code, PUSH, POP, stack initialization.

Miscellaneous data transfer instructions: XCHG, LAHF & SAHF.

#### Arithmetic instructions:

Addition, subtraction and comparison.

Multiplication and division.

BCD and ASCII arithmetic.

B. Sc. Comp. Sci.

*Kwaghmare*  
VC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



Page - 1 of 1

Page No.

1. The total number of students registered for the course is 100.

2. The number of students who passed the course is 75.

Course Code  
Total Credits  
Prerequisites

Prerequisites  
Total Credits

Signature

Name

Department Head

Date





Course Code: CS-213T

Course Title: Operating System-II

Total Credit: 2

Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)



### Prerequisites:

Student must possess fundamental skills of operating system.

### Learning Objectives

- To introduce students the Memory management, Disk management, Device management, Security Policy Mechanism and Introduction to Android Operating System.

### Learning Outcomes

Upon successful completion of the course, the students will:

- Gain knowledge of Memory Management, Paging and Segmentation.
- Understand concept of File, Operation of file, File allocation methods.
- Understand Disk fundamental, Disk Scheduling, Disk management.
- Understand Dedicated devices, Shared devices, I/O Devices, I/O Hardware, Interrupts
- Understand Security Policy Mechanism- Protection and Authentication.
- Understand the basic introduction to Android Operating System.

### Course Outline

#### Unit I: Memory Management:

Address Binding, Logical Vs. Physical address space, Memory Allocation Strategies- Fixed and Variable Partitions, Paging, Segmentation, Virtual Memory.

#### Unit II: Disk Management:

Concept of File, File Operation, Directory Structure, File Allocation Methods- Contiguous and Non-Contiguous allocation method, **Secondary Storage Structure:** Disk fundamental, Disk Scheduling – FCFS Scheduling, SSTF Scheduling, SCAN Scheduling, Disk management.

#### Unit III: Device Management:

Introduction: Dedicated devices, Shared devices and Virtual devices, Pipes, Buffer, I/O System Components : I/O Devices, I/O Hardware, Interrupts, Application I/O Interface.

#### Unit IV: Security Policy Mechanism:

**Protection:** Need of Protection in O.S., Goals of Protection, Domain of Protection, **Authentication-** Password, Encrypted Password and Encryption. Introduction to Android Operating System:  
Introduction to Android Operating System, Android Development Framework, Android Application Architecture.

#### Unit V: Test & Tutorials

#### Reference Books:

B. Sc. Comp. Sci.

VC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

1. "Operating System", By S.R. Sathe & Anil S. Mokhad, MacMillan Publication.
2. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications 2008.
3. A.S. Tanenbaum, Modern Operating System, 3rd Edition, Pearson Education 2007.
4. G. Nutt, Operating System: A Modern Perspective, 2nd Edition Pearson Edition 1997.
5. W. Stallings, Operating Systems, Internals & Design Principles 2008 5th Edition, Prentice Hall of India.
6. M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill 1992.

Course  
Total  
Per



*K. S. Patil*

VC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

Course Code: CS-214T

Total Credit: 2

Periods: 3 per week (50 Minutes each)

Course Title: Advance Programming in C

Marks: 50 (UA: 40 + IA: 10)



### Prerequisites:

Basic concepts of C language, Course CS-104T.

### Learning Objectives

- To develop modular applications in C using functions
- To develop applications in C using pointers and structures
- To do input/output and file handling in C.

### Learning Outcomes

Upon successful completion of the course, the students will be able to:

- Develop and implement modular applications in C using functions
- Develop applications in C using structures and pointers
- Design applications using sequential and random-access file processing
- Identify the difference between call by value and call by reference

### Course Outline

#### Unit I: Functions:

Introduction, Types of functions, defining functions, Arguments, Function prototype, actual parameters and formal parameters, calling function, Returning function results. Parameter Passing Mechanism: Call by Value & Call by Reference, Recursion.

#### Unit II: Structure, Union & Pointers:

Structure: Introduction, Declaration and initializing structure, Accessing structure members. Nested structures, Arrays of structure, typedef statement and Enumerated data types. Unions: Declaration, Difference between structure and union. Pointers: Introduction, The Address (&) and Indirection (\*) Operators, Declaration and initialization of pointers. Pointer expression and pointer arithmetic, Pointer to pointer. Dynamic Memory Allocation in C using malloc(), calloc(), free() and realloc()

#### Unit III: Storage classes, Preprocessors & String handling Functions:

Storage classes, Scope, visibility and lifetime of variable, block and file scope, auto, extern, static and register storage classes. String handling functions: strcpy(), strcmp(), strcat(), strlen(), strstr(), strchr(), gets(), puts(). Preprocessor Directives: File inclusion and conditional compiler directives, Macro substitution, #define, #if, #ifdef, #else, #elif, #endif

#### Unit IV: File Handling:

File handling: Introduction, Opening & closing a file, Input/output operations on files, text and binary files, getc(), putc() function. sprintf() and fscanf() function, fread() and fwrite() function. Writing and reading records from text file and binary file, Appending, modifying and deleting a record from file, Random access functions, fseek(), rewind(), flush(), remove(), rename() functions.

HC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

#### Unit V: Test & Tutorials

B. Sc. Comp. Sci.

Page 32 of 43

**Reference Books:**

1. Let us C: Y. P. Kanetkar [bpb publication]
2. Programming in C: E. Balagurusamy [Tata McGraw hill]
3. Programming in C: Gottfried [Shaums Series]



*Kwaghmare*  
IC Principal  
Modern College of Computer Science & IT,  
Aurangabad.

Course code: CS-215 T

Total Credit: 2

Periods: 3 per week (50 Minutes each)

Course Title: Numerical Methods M-2  
Marks: 50 (UA: 40 + IA: 10)



### Prerequisites:

Basic knowledge of Mathematics.

### Learning Objectives

- A student should be able to recall basic facts about mathematics and should be able to display knowledge of conventions such as notations, terminology, state important facts resulting from their studies..
- A student should get adequate exposure to global and local concerns that explore them many aspects of Mathematical Sciences.
- Students get familiar with numerical analysis.

### Learning Outcomes

Upon successful completion of the course, the students will be able to:

- Different number theory algorithms.
- Calculate approximate value for using approximation techniques.
- Solve numerical problems using different numerical methods.
- Write algorithms of different numerical techniques.

### Unit – I

Introduction: Mathematical Modeling, Characteristics, Error in Calculation, Significant Error, Absolute, Percentage Relative Error, Chopping off and Rounding off Error, Truncation Error, Propagation Error.

#### Divisibility Theory in the Integer:

- Early Number Theory.
- The division Algorithm.
- Greatest Common divisor.
- The Euclidean Algorithm.

### Unit- II

#### Numerical Solutions of Transcendental Equations:

- Introduction and Matrix Notation of set of Equations
- Gauss Elimination Method
- Gauss Seidal Method
- Matrix Inversion Method

### Unit-III

- Introduction and Polynomial Interpolation
- Newton-Gregory Forward Difference Interpolation Formula
- Newton-Gregory Backward Difference Interpolation Formula

*K. K. Kulkarni*  
H.O. Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



#### Unit- IV

- Newton's divided Difference Interpolation
- Lagrange's Interpolation

#### UNIT – V Test and Tutorial

##### Reference Books:

1. "Numerical Computational Methods" - Dr. P.B.Patil, Narosa Publication Hous.
2. Introductory Methods of Numerical Analysis by S. S. Sastry
3. Elementary Number Theory by David M. Burton
4. Numerical methods -S.C.Chapra, R.P.Canale-McGraw Hill
5. Numerical methods-E.Balguruswamy

*K. S. Kulkarni*

i/c Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

Course code: CS-216 T

Course Title: Database Management System

Total Credit: 2

Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)



### Prerequisites:

Basic knowledge of set theory and set operations, computer file management.

### Learning Objectives

- Learn what is data, database and DBMS
- Understand the basics of database designing.
- Learn different SQL statements

### Learning Outcomes

Upon successful completion of the course, the students will be able to:

- Design a database.
- Normalize a database.
- Create a database perform various operations on database.

### Unit – I

Introduction to Databases, Types of Data, Record and Files, File based System, What is database system, application and purpose of database system, Three-Level of data abstraction, instance and schema, data independence, database users, structure of a DBMS, Advantages and disadvantages of DBMS.

### Unit- II

Entity, attributes and data association relation between entities, The importance of data models, The evolution of data models, Type of Data Model, Advantages and disadvantages of each model.

### Unit-III

Database Design, Design Phases, Normal Forms 1NF, 2NF, 3NF and BCNF. ER-Model entity set, relationship set, attributes, constraints, ER-Diagram basic structure, mapping cardinality, Roles, weak entity set. Symbols used in ER-notations. ERD Issues, 12 Codd's rules,

### Unit- IV

SQL: SQL Languages DDL, DML, DCL, TCL, DDL Statements to Create and Manage Tables using Create & Alter, Manipulating Data using Insert, Update & Delete Statement., Retrieving Data Using SQL Select, Restricting and Sorting Data, Using SingleRow functions, Conversion Functions and Conditional Expressions, Aggregated Data Using Group Function, Displaying data from Multiple tables, Sub queries, Set Operators

### UNIT – V Test and Tutorial

### References:

1. Database system concepts( 6<sup>th</sup> edition) AviSilverschatz, Henry F. Korth, S. Sudarshan
2. An introduction to database systems by Bipin C. Desai

*K. V. K. K.*  
IC Principal

Modern College of Computer Science & IT,

Course Code: CS-231 T Course Title: English Communication Skill (Soft Skill Development)

Total Credit: 3 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)



### Prerequisites:

There are no prerequisites for attending this course.

### Learning Objectives

- To understand the fundamental soft skills and their practical social and workplace usage.
- It helps participants to communicate effectively and to carry themselves confidently and in harmony with the surroundings.
- To identify and overcome the barriers in interpersonal relationships.
- To employ oral and written communication, teamwork, leadership, problem-solving and decision-making skills, to gain best results.

### Learning Outcomes

Upon successful completion of the course, the students will be able to:

- Understand the significance and essence of a wide range of soft skills.
- Learn how to apply soft skills in a wide range of routine social and professional settings.
- Learn how to employ soft skills to improve interpersonal relationships
- Learn how to employ soft skills to enhance employ ability and ensure workplace and career success.

### Course Outline

#### Unit I:

**Soft Skills:** An Introduction – Definition and Significance of Soft Skills; Process, Importance and Measurement of Soft Skill Development. **Self-Discovery:** Discovering the Self; Setting Goals; Beliefs, Values, Attitude, Virtue. **Positivity and Motivation:** Developing Positive Thinking and Attitude; Driving out Negativity; Meaning and Theories of Motivation; Enhancing Motivation Levels.

#### Unit II:

**Public Speaking:** Skills, Methods, Strategies and Essential tips for effective public speaking. **Group Discussion:** Importance, Planning, Elements, Skills assessed; Effectively disagreeing, Initiating, Summarizing and Attaining the Objective, Do's and Don'ts of Group Discussion. **Non-Verbal Communication:** Importance and Elements; Body Language.

#### Unit III:

**Role Play:** Introduction, Basics of Role Playing, Role Play Script (Teacher-Student Script, Short Drama Script, Any Short Plays and etc.), **Interview Skills:** Interviewer and Interviewee – in-depth perspectives, Before, During and After the Interview, Tips for Success, Do's and Don'ts of Interview. **Presentation Skills:** Types, Content, Audience



Analysis, Essential Tips – Before, During and After, Overcoming Nervousness, Planning and Structuring your Presentation, Techniques of Delivery.



#### Unit IV:

**Etiquette and Manners:** Social and Business. **Stress Management:** Stress, Sources of Stress, Ways to Cope with Stress, **Time Management:** Concept, Essentials, Tips. **Leadership and Assertiveness Skills:** A Good Leader; Leaders and Managers; Leadership Theories; Types of Leaders; Leadership Behaviour; Assertiveness Skills. **Decision Making and Negotiation:** Introduction to Decision Making, Steps for Decision Making, Decision Making Techniques, Negotiation Fundamentals, Negotiation Styles, Major Negotiation Concepts, **Emotional Intelligence:** Meaning, History, Features, Components, Intrapersonal and Management Excellence; Strategies to enhance Emotional Intelligence.

#### Unit V: Test & Tutorials

#### Reference Books:

1. Soft Skills: an Integrated Approach to Maximise Personality, Gajendra S. Chauhan, Sangeeta Sharma, Wiley India
2. Managing Soft Skills for Personality Development – edited by B.N.Ghosh, McGraw Hill India, 2012.
3. English and Soft Skills – S.P.Dhanavel, Orient Blackswan India, 2010.

*K. Jaghman*

HC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



Course Code: CS-221 P Course Title : Practical based on CS-211 T and CS-212 T  
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)



Periods: 3 per week (50 Minutes each)

Sample List of experiments to be carried out based on the course CS-211 T.

Practical No	Details
	<b>Implement Arrays</b>
1	Write a program to store the elements in 1-D array and display the array in reverse
2	Write a program to read the two arrays from the user and merge them and display the elements.
3	Write a program to insert an element in already existing array.
4	Write a program to delete an element from an array.
	<b>Implement Searching</b>
5	Write a program to implement linear searching technique.
6	Write a program to implement binary searching technique.
	<b>Implement Sorting</b>
7	Write a program to sort a list using bubble sort technique and display the list before and after sorting.
8	Write a program to sort a list using selection sort technique and display the list before and after sorting.
9	Write a program to sort a list using insertion sort technique and display the list before and after sorting.
	<b>Implement Stack:</b>
10	Write a program to implement the concept of Stack with Push, Pop, Display and Exit operations.
11	Write a program to convert an infix expression to postfix conversion.
12	Write a program to convert an infix expression to prefix conversion.
13	Write a program to evaluate a postfix expression.
	<b>Implement Queue:</b>
14	Write a program to implement the concept of Queue with Insert, Delete, Display and Exit operations.
15	Write a program to implement the concept of Circular Queue

Sample List of experiments to be carried out based on the course CS-212 T.

1. Addition and subtraction of two 8-bit numbers with programs based on different addressing modes of 8086.
2. Addition and subtraction of two 16-bit numbers. (Using 2's complement method, also programs which access numbers from specified memory locations)
3. Multiplication of two 8-bit numbers using the method of successive addition and Shift & add.
4. Division of two 8-bit numbers using the method of successive subtraction and shift

B. Sc. Comp. Sci.

Abstract.  
5. Block transfer and block exchange of databytes.



*K. Srinivas*  
VC Principal  
Asian College of Computer Science & IT,  
Aurangabad.

Course Code: CS-222 P Course Title : Practical based on CS-213 T and CS-214 T

Total Credit: 1.5

Marks: 50 (UA: 40 + IA: 10)



Periods: 3 per week (50 Minutes each)

Sample List of experiments to be carried out based on the course CS-213 T.

1. Program to implement memory management first-fit, best-fit, worst-fit.
2. Program to implement file allocation technique linked list.
3. Program to implement FIFO page replacement algorithm.
4. Program to implement page replacement LRU algorithm.
5. Program to implement optimal page replacement algorithm.
6. Program to implement SSTF (Shortest Seek Time First) disk scheduling algorithm.
7. Setting user password at operating system level.
8. Installation of any two peripheral devices.
9. Study of Android development Framework.
10. Study of Android Program development Architecture.

Sample List of experiments to be carried out based on the course CS-214 T.

### Practical

no	Details
1	<b>Implement the following using functions</b> a) Write a program to exchange two numbers b) Write a program to find factorial of a given number
2	<b>Implement the following using structure</b> a) Write a program to create structure student b) Write a program to demonstrate array of structure
3	<b>Implement the following using union</b> a) Write a program to create union employee b) Write a program to find sizeof() structure and sizeof() union
4	<b>Implement the following using pointer</b> a) Write a program to demonstrate double pointer b) Write a program to exchange two numbers
5	<b>Implement the following storage classes</b> a) Write a program to demonstrate auto and static b) Write a program to demonstrate extern and register
6	<b>Implement the following using preprocessor directives</b> a) Write a program to find area of circle b) Write a program to demonstrate #ifdef, #if and #elif
7	<b>Implement the following using string handling functions</b> a) Write a program to calculate length of string and compare two strings b) Write a program for string copy and string concatenation
8	<b>Implement the following using recursion and enum</b> a) Write a program to find factorial of a given number using recursion b) Write a program to demonstrate enum data type
9	<b>Implement the following using file handling</b>

*K. K. Kulkarni*  
H/C Principal  
Modern College of Computer Science & IT,  
Bangalore

- a) Write a program for reading/writing text file.
- b) Write a program for reading/writing binary file

10

**Implement the following programs**

- a) Write a program to demonstrate rename() and remove() functions
- b) Write a program to demonstrate fseek() function

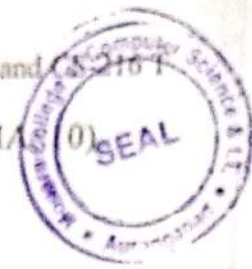


*Kiwaghmare*  
MC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

Course Code: CS-223 P Course Title : Practical based on CS-215T and CS-216 T

Total Credit: 1.5

Marks: 50 (UA: 40 + IA: 10)



Periods: 3 per week (50 Minutes each)

Sample List of experiments to be carried out based on the course CS-215 T.

1. Program in C for representation of, Bisection Method
2. Program in C for representation of, False Position Method
3. Program in C for representation of, Newton-Raphson Method
4. Program in C for representation of, Gauss Elimination Method
5. Program in C for representation of, Matrix Inverse Method
6. Program in C for representation of, Newton-Gregory Forward Difference Interpolation Formula
7. Program in C for representation of, Newton-Gregory Backward Difference Interpolation Formula
8. Program in C for representation of Newton's divided Difference Interpolation
9. Program in C for representation of Lagrange's Interpolation

Sample List of experiments to be carried out based on the course CS-216 T.

1. Design 10 schemas for any organization like : School, College, Hospital, Travel Agency, Bank, Company, Library, Shop etc
2. Draw the Entity Relationship Diagram for above organization.
3. Normalize the above selected schemas as per 1NF, 2NF, and 3NF
4. Solve at least 10 Relational Algebraic Queries.

*Kwaghmare*  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



S-30th May, 2015 AC after Circulars from Circular No.1 & onwards - 6 -

**DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY**

**CIRCULAR NO.ACAD/SU/Sci./B.Sc. & M.Sc. Syll./5/2015**

It is hereby notified for information to all the concerned that, on the recommendation of the Faculty of Science the Academic Council at its meeting held on 30-05-2015 has accepted the **revised semester-wise syllabi as mentioned against their names in the Faculty of Science as under :-**

Sr. No.	Name of the Subject	Semester
[1]	B.Sc. Computer Science Degree Course	III & IV
[2]	B.Sc. Information Technology Degree Course	III & IV
[3]	B.C.A. Science Degree Course	III & IV
[4]	B.Sc. Animation Degree Course	III & IV
[5]	B.Sc. Bioinformatics Degree Course	III & IV
[6]	B.Sc. Computer Science [Optional]	III & IV
[7]	B.Sc. Information Technology [Optional]	III & IV
[8]	B.Sc. Computer Applications [Optional]	III & IV
[9]	B.Sc. Computer Maintenance [Optional]	III & IV
[10]	B.Sc. Environmental Science [Optional]	V & VI
[11]	B.Sc. Bio-Chemistry [Optional]	V & VI
[12]	B.Sc. Forensic Science Degree Course	V & VI
[13]	B.Sc. Industrial Chemistry [Optional]	V & VI
[14]	B.Sc. Electronics [Optional]	V & VI
[15]	B.Sc. Zoology [Optional]	V & VI
[16]	B.Sc. Microbiology [Optional]	V & VI
[17]	B.Sc. Instrumentation Practice [Optional]	V & VI
[18]	B.Sc. Statistics [Optional]	V & VI
[19]	B.A. Statistics [Optional]	V & VI
[20]	B.A. / B.Sc. Mathematics [Optional]	V & VI
[21]	B.Sc. Home Science Degree Course	V & VI
[22]	B.Sc. Textile Interior Decoration Degree Course	V & VI
[23]	B.Sc. Fishery Science [Optional]	V & VI
[24]	B.Sc. Dairy Science & Technology [Optional]	V & VI
[25]	B.Sc. Botany [Optional]	V & VI
[26]	B.Sc. Physics [Optional]	V & VI
[27]	M.Sc. Computer Science	III & IV
[28]	M.Sc. I.T.	III & IV

This is effective from the Academic Year 2015-16 & onwards as appended herewith.

All concerned are requested to note the contents of the circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,  
Aurangabad-431 004.  
REF.NO.ACAD/SU/SCI./  
2015/3761-4160  
Date:- 16-06-2015.

\*  
\*  
\*  
\*  
\*  
\*\*\*\*\*

*[Signature]*  
**Director,**  
**Board of College and**  
**University Development.**

*[Signature]* ...2..  
IC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



8 30th May, 2015 AC after Circulars from Circular No.1 & onwards

B.Sc.Comp.Sci. IInd

:: 2 ::

**Copy forwarded with compliments to:-**

- 1] The Principals, affiliated concerned colleges,  
Dr. Babasaheb Ambedkar Marathwada University

**Copy to :-**

- 1] The Controller of Examinations,
- 2] The Director, [E-Suvidha Kendra], in-front of Registrar's Quarter,  
Dr. Babasaheb Ambedkar Marathwada University,
- 3] The Superintendent, [B.Sc. Unit],
- 4] The Superintendent, [M.Sc. Unit],
- 5] The Programmer [Computer Unit-1] Examinations,
- 6] The Programmer [Computer Unit-2] Examinations,
- 7] The Record Keeper.

S\*/-160615/-

\*\*\*\*\*

*Kwaghmare*  
**1/C Principal**  
Modern College of Computer Science & I.T.,  
Aurangabad.





Sr. No.	Paper Number	Name of the Paper Titles	Scheme of Teaching	Scheme of Evaluation(Marks)		
			Theory / Practical (Lect. / week)	Theory / Practical (Marks)	Exam Duration (in hrs.)	Total Marks
<b>III Semester</b>						
1	CS301-T	Advance Data Structure	3	50	2	50
2	CS302-T	Unix Operating System	3	50	2	50
3	CS303-T	PC Maintenance	3	50	2	50
4	CS304-T	Programming in CPP	3	50	2	50
5	CS305-T	Database Management System	3	50	2	50
6	CS306-T	Statistical Method	3	50	2	50
7	CS307-P	Data Structure using CPP	4	100	2	100
8		DBMS	4		2	
9	CS308-P	PC Maintenance	4	100	2	100
10		Unix	4		2	

<b>IV Semester</b>						
1	CS401-T	Software Engg.	3	50	2	50
2	CS402-T	Fedora	3	50	2	50
3	CS403-T	Basic of Networking	3	50	2	50
4	CS404-T	Core Java	3	50	2	50
5	CS405-T	Adv. DBMS	3	50	2	50
6	CS406-T	Web Fundamental	3	50	2	50
7	CS407-P	Java in Fedora OS	4	100	2	100
8		Web Funda	4		2	
9	CS408-P	Based in Adv. DBMS and N/w	4	100	2	100
10		Mini Project	4		2	

*Kwaghmare*  
 HC Principal  
 Modern College of Computer Science & I.T.,  
 Aurangabad.



Course: B.Sc.(C.S.)

Semester : III

Topic: Advanced Data Structure

Paper No.: CS301-T

- 1 Unit – I Binary Trees  
Representing Binary, Trees in Memory, Traversing Binary Trees, Traversal Algorithms using Stacks, Header Nodes; Threads, Binary Search Trees Searching and Inserting in Binary Search Trees, Deleting in Binary Search Tree, AVL Search Trees, Insertion in an AVL Search Tree, Deletion in an AVL Search Tree,
- 2 Unit – II Graph Theory  
Terminology, Sequential Representation of Graphs; Adjacency matrix, Path Matrix, Warshall's Algorithm, Shortest Paths, Linked Representation of a Graph, Operations on Graphs, Traversing a Graph, Posets; Topological Sorting.
- 3 Unit – III Searching & Sorting:  
Introduction, Sorting, Insertion sort, Selection sort, Merging, Merge-Sort, Radix Sort, Searching and Data Modification, Hashing.

Assignment:

Question to be solved from supplementary problems from the core reference book recommended below: 7.1, 7.2, 7.3, 7.4, 7.9, 8.1, 8.5, and 8.6.

Core References:

1. Data Structures: By Seymour Lipschutz, Tata McGraw- Hill Publication.

Advance Reference:

1. Fundamentals of Data structures, by Horowitz and Sahani (Galgotia publications).
2. An introduction to data structures and application, by Jean Paul Tremblay & Pal G. Sorenson (McGraw Hill).
3. Data Structures, by Tannenbaum, (PHI).

*K. V. Kulkarni*  
HC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



Course: B.Sc.(C.S.)

Semester : III

Topic: Unix Operating System

Paper No.: CS302-T

**1 Unit – I**

Overview of UNIX Operating System, basic features of Unix operating System, File Structure, CPU Scheduling, Memory Management, File System Implementation of Operating System Functions in UNIX.

**2 Unit – II**

Basic commands ls, cat, cal, date, calendar, who, printf, tty, sty, uname, passwd, echo, tput, bc, script, spell and ispell,. Files and Directories, File permission, Basic Operation on Files, Changing Permission Modes, Standard files

**3 Unit – III**

Introduction to Shell Scripting, Shell Scripts, read, Command Line Arguments, Exit Status of a Command, The Logical Operators && and ||, exit, if, and case conditions, expr, sleep and wait, while, until, for, \$, @, redirection. The here document, set, trap, Sample Validation and Data Entry Scripts.

Define system Administration, Booting the system, Maintaining User Accounts, File System, and special files, Backup and Restoration

**TEXT BOOKS:**

1. Unix the ultimate guide, Sumitabha Das, TMH.

**REFERENCES:**

1. Advanced programming in the Unix environment, W.R.Stevens, Pearson education.
2. Unix system programming using C++, T.Chan, PHI.
3. Unix programming environment, Kernighan and Pike, PHI. / Pearson Education
4. Unix Internals The New Frontiers, U.Vahalia, Pearson Education.
5. Unix for programmers and users, 3rd edition, Graham Glass, King Aables, Pearson Education.

*K. V. Prasad*  
The Principal  
Modern College of Computer Science & I.T.,  
Alwarabad.

1 Unit – I: PC Architecture:

Chassis/Case, Baby, Desktop, Tower Cases. Power Supplies, power connectors, mounting points. Motherboard, form factors, expansion/bus slots, CPU, RAM, BIOS, Chipset, motherboard ports and Controllers. Video System, video controllers, resolution, video memory, Video Drives, IDE drive, SCSI controllers, CD Drive, DVD Drive, Modems, Input devices and their drivers, USB architecture, USB Host Control types.

2 Unit – II: PC Assembly

Opening the System, Closing the System, Tips for working inside a PC, Mounting Motherboard in cabinet, installation of cards, devices and then connecting cables. Role of CMOS Entering CMOS setup, Basic CMOS Optimization, Hidden CMOS Settings.

3 Unit – III: Software Installation

Operating System installation, Windows, Unix, Linux, Device driver Installation, Creating users, giving rights to user, Network setting of a PC, shearing files and devices on network. Installing Antivirus, Antivirus settings updating (Quick Heal/ Netprotector)  
**Introduction to Laptop:** System Features, Laptop components, Processors, Motherboards, memory, power, expansion bus, hard disk & removable storage devices

Books:

- 1) Troubleshooting, Maintaining & Repairing PCs by Stephen J. Bigelow, Tata McGraw-Hill.
- 2) The Complete PC Upgrade and Maintenance Guide by Mark Minasi, BPB Publication
- 3) Fault Finding and Troubleshooting on Laptop.

*Kwaghmare*  
V/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



Course: B.Sc.(C.S.)

Semester : III

Topic: Programming in C++

Paper No.: CS304-T

**1 Unit – I: Introduction of OOPs**

Procedural Vs Object Oriented Programming, Basic concepts of Object Oriented Programming, Class, Object, Data Abstraction, Encapsulation, Inheritance, Polymorphism, Dynamic Binding, Message Passing. Benefits and applications of OOP, History and overview of C++, C++ program structure. Reference variables, Scope resolution operator, Member dereferencing operators, new and delete, cin and cout, The endl and setw manipulator.

**Functions in C++:**

Function prototype, Call by reference (using reference variable), Return by reference, Inline function, Default arguments, Const arguments.

**2 Unit – II: Function overloading:**

Different numbers and different kinds of arguments,

**Objects and Classes:**

Specifying a class, private and public, Defining member functions. Nesting of member function, Object as data types, Memory allocation for objects, static data members and member functions. Array of objects, Objects as function argument, returning objects, Friend function and its characteristics.

**3 Unit – III: Constructors and Destructors:**

Introduction, default and parameterized constructors, Multiple constructors in a class, Copy Constructor, Destructors

**Operator Overloading:**

Overloading unary operators, Rules for operator overloading, Overloading without friend function and using friend function, Overloading binary operators such as arithmetic and relational operators, Concatenating Strings, Comparison operators.

**Reference Books:**

1. Object Oriented Programming with C++ E. Balagurusamy, Tata McGraw-Hill Publishing
2. Object Oriented Programming In C++ Robert Lafore, Galgotia
3. Let us C++ Yeshwant Kanetkar: bph publication

*Kwaghmare*  
HC Principal  
Modern College of Computer Science & I.T.,  
Mumbai



Semester : III

Course: B.Sc.(C.S.)

Paper No.: CS305-T

Topic: Database Management System

1 Unit – I: Basic Concept

- Data Definition, Types of Data, Record and File, File based System & Processing
- Database System Application, Purpose of Database System
- Abstraction & Data Integration
- Three level Architecture proposal for a DBMS.
- Component of a DBMS: Users, Facilities & Structure.
- Advantageous & Disadvantageous of DBMS.

Data Modeling & Design

- Data Association – Entities , Attributes & Association, Relationship among Entities, Representation of Association & Relationships
- Data Model: Importance of Data Model, Types of Data Model: Relational, E-R, Semi-structured, Object-Oriented, Network & Hierarchical Data Model. Advantageous & Disadvantageous of above model.

2 Unit – II: Entity-Relationship Data Model

- Entity , Entity Set, Types of Entities, Strong & Weak Entity, Representation
- Attribute, Types of Attributes , Representation
- Relationship : Binary & Ternary , Representation
- Mapping Cardinality, Entity-Relationship Design Issues

Relational Data Model

- Basic Structure of Relational Data Model, Database Schema
- Constraints : Integrity Rule 1 & 2
- Normal Form: Anomalies, Functional Dependency, Dependency Diagram, First Normal Form, Second Normal Form, Third Normal Form, Conversion from Universal to 1 NF, 1NF to 2 NF and 2NF to 3NF.

3 Unit – III: Relational Algebra

- Basic Operation – Union , Intersection, Difference and Cartesian Product
- Advance Operation- Projection, Selection, Join ( Inner and Outer) & Division
- Examples based on above Operation.
- Relation Algebraic Queries.

Introduction to Oracle

- Oracle Software : Versions of Oracles, Products of Oracle, Tools of Oracle
- SQL: Logging to SQL/ iSQL, SQL plus worksheet.

Books:

- 1) Database System Concepts (Sixth Edition ) AviSilberschatz, Henry F. Korth,S. Sudarshan
- 2) An Introduction to Database Systems by Bipin C. Desai
- 3) Easy Oracle SQL: Get Started Fast Writing SQL Reports with SQL.\*Plus By John Garmany
- 4) Mastering Oracle SQL By Sanjay Mishra, Alan Beaulieu

*K. S. Kulkarni*  
V/C Principal

Modern College of Computer Science & I.T.,  
Aurangabad.



Course: B.Sc.(C.S.)

Semester : III

Topic: Statistical Method

Paper No.: CS306-T

- 1 Introduction and basic concepts of Statistics
  - Definition of Statistics, Scope and importance of Statistics.
  - Primary and Secondary data, Types of data : qualitative, quantitative, discrete, continuous, cross-section, time series, failure, industrial, directional data.
  - Graphical presentation: Histogram, frequency polygon, frequency Curves Diagrammatic presentation: Bar diagrams, Pie diagram, scatter diagram.
  - Classification of data: Discrete and continuous frequency distributions, inclusive and exclusive methods of classification, relative and cumulative frequency distributions.
- 2 Measures of Central Tendency
  - Concept of central tendency, For group and Ungroup data
  - Arithmetic mean (A.M.) simple and weighted Merits and demerits of A.M., Mode: Computation for frequency and non-frequency data.
  - Computation of mode, Merits and demerits of mode, Median: Computation for frequency and non-frequency data, computation Merits & demerits of median.
  - Geometric mean (G.M.) computation for G.M., Merits demerits and applications of G.M., Harmonic Mean (H.M.) computation for frequency, non-frequency data, merits, demerits.
- 3 Measures of Dispersion
  - Dispersion and measures of Dispersion.
  - Range (definitions and problems) Quartile Deviation (definitions and problems) Mean Deviation (definitions and problems) Standard Deviation (definitions and problems) Variance, different formulae for calculating Variance.

Books:

1. Fundamental of Mathematical Statistics By S.C. Gupta and V.K. Kapoor

*K. Singh*

HC Principal  
Modern College of Computer Science & IT,  
Aurangabad.

SIPABP



Course: B.Sc.(C.S.)

Semester : III

Topic: Data Structure using C++

Paper No.: CS307P (A)

Minimum 10 Practicals to be performed as per the guidelines of teaching Faculty depending upon all theory units of concerned subject.

Course: B.Sc.(C.S.)

Semester : III

Topic: Database Management System

Paper No.: CS307P(B)

- 1) Design five schemas for any organization like: College, school, hospital, travel agency, company, bank etc.
- 2) Normalize the above five selected schemas as per 1NF,2NF and 3NF
- 3) Draw E-R Diagram for the same.
- 4) Solve atleast ten Relational Algebraic Queries

Course: B.Sc.(C.S.)

Semester : III

Topic: P.C. Maintenance

Paper No.: CS308P(A)

1. Identification of the various components inside the PC Cabinet.
2. Connecting Various device to PC
  - a. Input Devices (Mouse, Keyboard, Scanner, Mic etc.)
  - b. Output Devices (Monitor, Printers, Speakers, Head Phones, Projector etc.)
  - c. Storage Devices (Pen Drive, Memory Cards, External HDD, etc.)
3. Connection of SMPS to Mother board and other components.
4. Mounting and dismounting of CMOS Battery, Processor, HDD, RAM, CD/DVD drive, Mother board
5. Making various BIOS settings like booting device sequence, enabling and disabling various ports, setting system time, date, max temperature etc.
6. Formatting HDD, creation of Partitions, Installation of Operating System, Creating Users setting rights to user,
7. shearing devices, sharing files and folders, accessing networking devices, Files and folders. Use of Disk clean up, disk defragmentation, installation of regional fonts.
8. Installation of device drivers for various devices.
9. Installation of Antivirus, installing it's updates and patches, it making various settings.
- 10 Assembly and Disassembly of Battery, CD/DVD, RAM, HDD etc. of Laptop.

Course: B.Sc.(C.S.)

Semester : III

Topic: Unix

Paper No.: CS308P(B)

Minimum 10 Practicals to be performed as per the guidelines of teaching Faculty depending upon all theory units of concerned subject.

*[Signature]*  
Co-ordinator (ADC)

*[Signature]*  
MC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.





Course: B.Sc.(C.S.)  
Topic: Software Engineering

Semester: IV  
Paper No.: CS401-T

- 1. Unit I: Software and Software Engineering  
What is Software, Characteristics of software, categories of Software, attributes of Web Apps, software Engineering, Software Process, Essence Software Engineering Process, General Principles, Software Myths, Software Process and Process Models  
Software process Model Process Flow, Process Models, Waterfall model, Iterational Process Model, Evolutionary Process Models, Concurrent Iterative Sequential Process Models, The Unified Process, Personal and team Process Models, Product and Process
- 2. Unit II: Agile  
Introduction to Agile, Agile and the Cost of Change, Agile Process, Agile - metrics, Human Factors, Extreme Programming (XP), XP Values, XP Process, Industrial, Critics of XP  
Other Agile Process Models  
Adaptive Software Development (ASD), Scrum, Dynamic Systems Development Method (DSDM), Crystal, Feature Driven Development (FDD), Lean Software Development (LSD), Agile Modeling (AM), Agile Unified Process, UTP
- 3. Unit III: Principles That Guide Practice  
Principles - The Guide Process, Principles That Guide Practice, Communication Principles, modeling principles, Modeling Principles, Construction Principles, deployment Principles

Reference Books:

1. Software Engineering a Practitioner's Approach By Roger S. Pressman (Seventh Edition) McGraw Hill
2. An Integrated Approach to Software Engineering, Pooja Jais, Naras

*K. Kulkarni*  
IC Principal  
Modern College of Computer Science & IT,  
Aurangabad.



Course: B.Sc.(C.S.)

Semester : IV

Topic: Fedora

Paper No.: CS402-T

**1 Unit-I: Introduction to Fedora**

- Basic concepts of Operating System, Kernel, Shell & File System structure
- Basic concepts of Linux
- What is Linux, Linux's Roots in Unix, Linux Features, Advantages of Linux.
- What is Fedora, Features of Fedora
- Installing Fedora
- Differences between CentOS, Red Hat Enterprise Linux & Fedora
- Basic commands of Linux
- Advanced Linux Commands

**Introduction to Graphical Environment**

- Logging to Fedora : Desktop : GNOME & KDE
- Differences between GNOME & KDE
- Features of GNOME & KDE
- Use and customize the GNOME interface
- Perform command tasks using the GNOME GUI
- Launch applications from command line & GNOME interface
- Customize X Window System

**2 Software Package Administration**

- Installing and deleting software packages
- Querying and updating software packages

**User and Group Administration**

- Creating and deleting users from the systems
- Modifying users profile
- Creating and deleting groups
- Important system files related to user administration

**3 Advanced File Permissions**

- Assigning advanced files permissions i.e. chmod, chown, chgrp & Sticky bit
- Creating, modifying and deleting ACL's

**Disk Partitioning and Mounting File System**

- Using fdisk, disk druid utilities for disk partitioning
- Using mkfs, commands to create file systems
- Mounting various file systems
- Auto mounting of file system

Books:

1. Bible Fedora 14

*Kwaghmare*  
VC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



Course: B.Sc.(C.S.)

Semester : IV

Topic: Basic of Networking

Paper No.: CS403-T

1 Unit-I

Introduction

Communication System, Components of communication system, Computer network Advantages and applications of computer n/w. point-to-point and multipoint line configuration, LAN, MAN and WAN. Analog and Digital signals. Data Transmission: Parallel and Serial, Synchronous and Asynchronous transmission, Transmission Mode: Simplex, half-duplex and full-duplex.

Network Topologies

Mesh, Star, Tree, Bus and Ring and Hybrid Topology (Advantages and disadvantages of each)

2 Unit- II

Transmission media

Guided and unguided media, Twisted-pair, UTP and STP cable, coaxial cable, Optical Fiber cable, Radio waves, Microwaves, Satellite Communication (*Transmission characteristics and advantages of each type*)

Modulation & Multiplexing

Concept of modulation and demodulation, Digital-to-analog conversion, Amplitude Shift Keying (ASK)/AM, Frequency Shift Keying (FSK)/FM, Phase Shift keying (PSK)/PM.

3 Unit- III

THE MOBILE TELEPHONE SYSTEM:

First Generation(1G), Second Generation(2G), Third Generation(3G), Internet over cable, Spectrum Allocation, cable Modem, ADSL Versus Cable.

Reference Books:

1. Introduction to Digital and Data Communications, Michal A Miller, JAICO, publishing
2. Data Communication and Networking: C.S.V. Murthy, Himalaya Publishing House
3. Data Communication and Networking :: Behrouz A. Forouzan; Mc-Graw Hill Pub.
4. Computer Networks by A. S. TANENBAUM, DAVID J. WETHERALL PRENTICE HALL Publication

*K. Srinivas*  
IC Principal  
Modern College of Computer Science & IT,  
Aurangabad.



Course: B.Sc.(C.S.)

Semester : IV

Topic: Core Java

Paper No.: CS404-T

1 **Unit-I: Object oriented paradigm**

Basic concepts of Object oriented programming: class & object, data abstraction and encapsulation, inheritance, polymorphism, dynamic binding, message communication. Benefits and applications of OOP. History and features of Java. Java Vs. C++. Java and Internet, Java and www. Java environment. Structure of java program, symbolic constants. Data types.

**Arrays, Classes and Objects**

Declaration and initialization, one and multidimensional arrays Defining a class, adding variables and methods, creating objects, static fields and static methods. Method overloading, Constructors: types and multiple constructors in class. Command line arguments.

2 **Unit-II: Inheritance**

Super and sub class, defining a subclass. Single inheritance, multilevel inheritance and hierarchical inheritance. Subclass constructors. Super keyword, Visibility controls, Method overriding, Dynamic method dispatch. Abstract methods and class.

**Interfaces, String and Vector Class**

Defining interfaces, implementing interfaces, extending interfaces, accessing interface variables. String class and its methods, Vectors

3 **Unit-III: Packages**

Introduction, Java API packages, Naming conventions, creating and accessing user defined package, using a package, adding a class to a package, importing classes from package.

**Exception handling and Multithreading**

Exceptions, syntax of exception handling code, multiple catch statements, throw: throwing own exceptions, throws and finally Introduction to multithreading, creating threads by extending the Thread class and by implementing Runnable interface, implementing the run() method, Life cycle of a thread, Thread methods and thread priority.

**Books:**

1. Programming with JAVA: E. Balagurusamy, Tata Mc-Graw Publishing Company Ltd.
2. The Complete Reference J2SE: Herbert Schildt, Tata Mc-GrawPub. Comp.Ltd.
3. Core Java-2 Vol-I &Vol-II - Cray S. Horstmann, Gray Corneel; Pearson Education, Low Price edition

*Kwaghmare*  
HC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



Course: B.Sc.(C.S.)

Semester : IV

Topic: Advance Database Management System

Paper No.: CS405-T

- 1 Unit – I: Structured Query Language
  - DDL Statements to Create and Manage Tables using Create & Alter
  - Manipulating Data using Insert, Update & Delete Statement
  - Retrieving Data Using SQL Select, Restricting and Sorting Data, Using Single-Row functions, Conversion Functions and Conditional Expressions
  - Aggregated Data Using Group Function, Displaying data from Multiple tables, Sub queries, Set Operators
- 2 Unit – II: Data Storage
  - Overview of Physical Storage Media
  - Magnetic Disk
  - RAID
  - Tertiary Storage
  - Storage Access

Database System Architecture

  - Centralized and Client-Server Architecture
  - Server System Architecture
  - Parallel System
- 3 Unit – III: Transaction Processing
  - Transaction Concept
  - Transaction State
  - Implementation of Atomicity and durability
  - Concurrent Execution

Concurrency Control Techniques

  - Lock-Based Protocol
  - Timestamp-Based Protocol
  - Deadlock Handling

Books:

- 1) Database System Concepts (Sixth Edition) AviSilberschatz, Henry F. Korth,S. Sudarshan
- 2) An Introduction to Database Systems by Bipin C. Desai
- 3) Easy Oracle SQL: Get Started Fast Writing SQL Reports with SQL\*Plus By John Garmany
- 4) Mastering Oracle SQL By Sanjay Mishra, Alan Beaulieu

*Kaushik*  
HC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



Course: B.Sc.(C.S.)

Semester : IV

Topic: Web Fundamental

Paper No.: CS406-T

- 1 **Unit-I: Introducing HTML5**
  - Understanding HTML, XHTML, and HTML5, Introducing semantic markup, Syntax, Attributes, Working with elements, Creating an HTML document
  - Embedding content, Embedding HTML by using inline frames, Working with hyperlinks, Adding images to your HTML document, Embedding plug-in content

**Advances of HTML5**

  - HTML5 Layout container
  - Format using <div> element
  - Working with Tables: creating regular and irregular tables, heading, columns and rows, captions, header, footer.
- 2 **Unit-II: Introducing JavaScript**
  - Basic of JavaScript
  - JavaScript Variables, Operators & Its Precedence, Special Values,
  - Predefined Built-In Functions, Functions Declaration & Call
  - String Functions
  - Conditions and looping structure,
  - Inline JavaScript & External JavaScript

**Advances in JavaScript**

  - Object in JavaScript, Concept of array, how to use it in JavaScript, types of an array, array methods
  - DOM Concept in JavaScript, DOM Objects, DOM Search Methods
  - Event handling in JavaScript: Capturing & Bubbling, Subscribing, Unsubscribing and Cancelling Event, Windows Event, Keyboard and Mouse Events.
- 3 **Unit-III: Cascading Style Sheet**
  - Introduction to CSS3
  - Defining and Applying a Style, Inline, Embedded and External Style Sheet.
  - Selectors: element, id and class selector, grouping selector, attribute,
  - Specificity and cascading
  - CSS properties: Color, box Model, border, padding, margin, float, clear

**Books:**

- 1) Programming in HTML5 with Javascript and CSS3 , Glenn Johnson  
([http://www.daoudisamir.com/referencess/ys\\_ebooks/html5\\_css3.pdf](http://www.daoudisamir.com/referencess/ys_ebooks/html5_css3.pdf))
- 2) Beginning HTML5 and CSS3 By Richard Clark, Oli Studholme, Christopher Murphy and Divya Manian. ([http://www.alvinisd.net/cms/lib03/TX01001897/Centricity/Domain/1077/beginning\\_html5\\_and\\_css3.pdf](http://www.alvinisd.net/cms/lib03/TX01001897/Centricity/Domain/1077/beginning_html5_and_css3.pdf))
- 3) A Definitive Guide to HTML5 , By Adam Freeman

*Kwaghmare*  
VC Principal  
Modern College of Computer Science & I.T.  
Aurangabad



Course: B.Sc.(C.S.)

Semester : IV

Topic: Practical Based on Java in Fedora O.S.

Paper No.: CS407P (A)

Minimum 10 Practicals to be performed as per the guidelines of teaching Faculty depending upon all theory units of concerned subject.

Course: B.Sc.(C.S.)

Semester : IV

Topic: Practical Based on Web Fundamental

Paper No.: CS407P(B)

- Exercise 1. Create a simple website by using Visual Studio Express
- Exercise 2. Create additional pages
- Exercise 3. Embedding Content
- Exercise 4. Create a webpage using <table> and <div> elements
- Exercise 5. Create a webpages using conditional and looping statements.
- Exercise 6. Create a calculator webpage
- Exercise 7. Create a Webpage to introduce National Bird/Animal/Emblem/Flower
- Exercise 8. Learn more about positioning by adding more <div> elements to the webpage to define a header and footer for the page. Use CSS style rules to set the position.
- Exercise 9. Learn more about CSS selectors by adding more elements to the page and try setting the format by selecting the elements without using an id.
- Exercise 10. Learn more about colors by changing the color scheme, using RGB values.

*Kwaghmare*

I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



Course: B.Sc.(C.S.)

Semester : IV

Topic: Practical Based on Adv. DBMS

Paper No.: CS408P(A)

- 1) Using SQL commands to create the tables and views of five schemas for any organization like: College, school, hospital, travel agency, company, bank etc.
- 2) Perform Data Definition Language Commands
- 3) Perform Data Manipulation Language Commands
- 4) Perform Minimum 10 Queries on each of the above five schemas.

Course: B.Sc.(C.S.)

Semester : IV

Topic: Mini Project Using VB.Net

Paper No.: CS408P(B)

**Note:**

- 1) It is expected that concerned Faculty is to introduce and make the students aware about the VB.Net in First Three-Four Practical before commencing of Mini-Project.
- 2) A mini project having minimum 5 forms, use VB.Net as a front end and any DBMS as backend. Team size maximum 2 students.

**Minimum contents of Project Report**

1. Introduction
2. Problem definition.
3. System Requirement Specification
  - 3.1. User Interview
  - 3.2. Current System flow diagram
  - 3.3. Proposed System.
4. E-R Diagram
5. DFD
6. Sample Screens
7. Conclusion

*Kwayhmar*

VC Principal

Modern College of Computer Science & I.T.,

Co-ordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.







NO. 103 & 102 June, 2016 AC after Circulars from Circular No. 103 & onwards  
:: [2] ::

Copy forwarded with compliments to :-

- 1] The Principals, affiliated concerned Colleges,  
Dr. Babasaheb Ambedkar Marathwada University.

Copy to :-

- 1] The Controller of Examinations,
- 2] The Section Officer, [B.Sc. Unit],
- 3] The Section Officer, [B.C.S. Unit],
- 4] The Programmer [Computer Unit-1] Examinations,
- 5] The Programmer [Computer Unit-2] Examinations,
- 6] The In-Charge, E-Suvidha Kendra, [Professional Unit], Rajarshi  
Shahu Maharaj Pariksha Bhavan, Dr. Babasaheb Ambedkar  
Marathwada University,
- 7] The Record Keeper,  
Dr. Babasaheb Ambedkar Marathwada University.

S/7-0070616/-

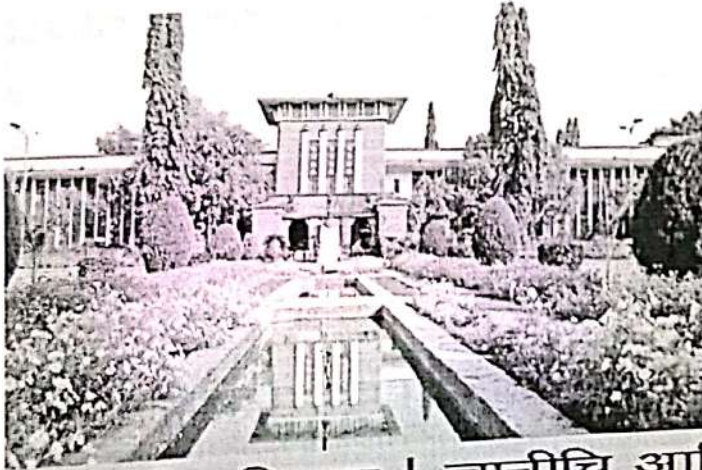
*K. S. Khosla*  
KC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad



NAAC Re-accredited with Grade 'A'  
Dr. Babasaheb Ambedkar Marathwada University  
Aurangabad-431004



**REVISED SYLLABUS OF**  
B.Sc. (Computer Science)  
Three Year Course  
(With Effective From: 2014-15)



हे ज्ञानिची पवित्रता | ज्ञानीचि आथि ||

Dr. Babasaheb Ambedkar Marathwada University  
Aurangabad-431004.

Tel.No. : 0240-2403400/431, Fax:0240-2403113

Website : [www.bamu.ac.in](http://www.bamu.ac.in), <http://bamua.digitaluniversity.ac.in>

*Kwaghmare*

I/C Principal

Modern College of Computer Science & I.T.,  
Aurangabad.

**Dr. Babasaheb Ambedkar Marathwada University.**  
**Appendix 'A'**

A Candidate shall be admitted to the I year of the B.Sc. (Computer Science) degree course only if he/she satisfies the following condition:

1. He/ She must have passed the higher secondary (multipurpose) examination conducted by H.S.C. board Government of Maharashtra with science / technical subjects Or an Examination of any statutory University and Board recognized as equivalent thereto.

OR

He/She must have passed examination prescribed at the end of second year of the junior college conducted by the H.S.C. board, Government of Maharashtra with English, Second language, Physics, Chemistry, Mathematics and or Biology or one of the technical subjects prescribed at the said examination as the optional or elective subjects or an examination recognized as equivalent thereto.

OR

Candidate having offered prescribed vocational course (MCVC) with Computer techniques/I.T./Electronics.

OR

Three years Diploma Course in engineering conducted by the board of technical Education, Maharashtra State.

2. He/ She must have passed at qualifying examination.

A candidate who has passed the B.Sc.(Computer Science) examination of this university may be allowed to present himself subsequently at the degree examination in a subject or subjects other than those he has taken earlier provided that he puts in three years of attendance as a regular candidate for First, Second and Third year in the subject or subjects concerned excluding compulsory English, Second Language and remaining optional subject(s).

A candidate shall not be allowed to appear for such examination if he has passed the higher examination.



The Degree of Bachelor of Science (Computer Science) shall be conferred on candidate who has pursued a regular course of study consisting of six semesters in the relevant subject as prescribed and has appeared at the end examination and passed under the credit based system in all the examination prescribed for the Degree course in the faculty.

The pattern of the examination and the scope is indicated in the syllabus.[Annexure B]

The Number of students in a theory class shall not exceed 60.

Maximum number of students in a batch for practicals in first four semesters shall consist of 20 students and for fifth & sixth semester the batch shall consist of 15 students.

The rules for admission to the subsequent (next) semesters will be the same as per the University guidelines.

For Each course the concerned teacher will have to conduct Class tests after completion of 15 and 20 lectures. The mark list of the same is to be submitted to the university authority within 7 working days after the completion of class tests.

Final Examination will be conducted by the University based on the complete syllabus.

Final Practical Examination will be conducted by the university and examiners will submit the marks in the prescribed format of students for practical examination to the university.

**The Number of Teaching Staff & infra-structure required to run the course will be as follow:-**

The graduation is very important phase in the life of our young students. The college responsibly is not only to deliver a quality syllabus based education, but also to motivate them to be a good healthy citizen. In this direction, the college must have sufficient facilities to run the course. A guideline is listed below. The College must have following minimum facilities:

**Infrastructure:**

*Kwaghmare*  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

1. One Class room to accommodate 60 students. (approximately 250 sq.ft.)
2. A well equipped software Laboratory having a LAN system of 30 nodes and having internet connectivity with broad band. All legal software, antivirus software, firewall be available for smooth functioning of the laboratory.
3. A hardware laboratory having twenty microprocessor kits with add on cards as per their syllabus. Staff room of 100 sq.ft. with one table and one Almeria for each faculty member.
4. One office space of 100 sq.ft. with appropriate furniture.
5. One lady room of 100 sq.ft. with attached toilet.
6. One reading room of 200 sq.ft. with seating arrangements for at least 30 people. The library may be accommodated in the library.
7. One copy of every text book among five students for each subject be available along with one copy of reference book as per the syllabus.
8. Library must subscribe for computer and scientific magazines. Appropriate general reading materials must be available for overall development of students.
9. An open space for sports activities. The college must be encouraged to have sport equipments.

**Staff:**

1. The head of the department in the scale of reader/Professor.
2. The minimum number of teachers must be appointed as per the work load. Per semester, the work load may be computed on the basis of theory classes, tutorials and practical class per batch. Minimum number of teachers to run the course must be five excluding the head. Teachers must be appointed by the university/UGC norms. The quality of the course is directly related to quality of teachers for the course.
3. There must be one clerk in the office to look after administrative work. The placement of all staffs must be maintained properly.
4. One qualified librarian  
An appropriate number of class IV employees.

*K. S. Ghosh*  
H.C. Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

Sr. No.	Paper Number	Name of the
I Semester		
1	CS101-T	
2	CS102-T	
3	CS103-T	
4	CS104-T	
5	CS105-T	
6	CS106-T	
7	CS107-T	
8	CS108-T	
9	CS109-T	
10	CS110-T	
II Semester		
1		
2		
3		



## Curriculum Structure and Scheme of Evaluation: B.Sc.(C.S.)

Sr. No.	Paper Number	Name of the Paper Titles	Scheme of Teaching	Scheme of Evaluation(Marks)		
			Theory / Practical (Lect. /week)	Theory / Practical ( Marks )	Exam Duration (in hrs.)	Total Mark
<b>I Semester</b>						
1	CS101-T	Computer Fundamentals	3	50	2	50
2	CS102-T	Digital Electronics	3	50	2	50
3	CS103-T	Microprocessor - I	3	50	2	50
4	CS104-T	C Programming – I	3	50	2	50
5	CS105-T	Communication Skill – I	3	50	2	50
6	CS106-T	Mathematical Foundation	3	50	2	50
7	CS107-P	Office Suite	4	50	2	50
8		C Programming – I	4	50	2	50
9	CS108-P	Microprocessor – I	4	50	2	50
10		Digital Electronics	4	50	2	50
<b>II Semester</b>						
1	CS201-T	Data Structure	3	50	2	50
2	CS202-T	Operating System	3	50	2	50
3	CS203-T	Microprocessor – II	3	50	2	50
4	CS204-T	C Programming – II	3	50	2	50
5	CS205-T	Communication Skill – II	3	50	2	50
6	CS206-T	Numerical Computation Methods	3	50	2	50
7	CS207-P	Data Structure	4	50	2	50
8		Microprocessor – II	4	50	2	50
9	CS208-P	C Programming – II	4	50	2	50
10		Numerical Comp. Methods	4	50	2	50

*K. S. Kulkarni*  
 IC Principal  
 Modern College of Computer Science & I.T.,  
 Aurangabad.



Sr. No.	Paper Number	Name of the Paper Titles	Scheme of Teaching	Scheme of Evaluation(Marks)		
			Theory / Practical (Lect. / week )	Theory / Practical ( Marks )	Exam Duration ( in hrs.)	Total Marks
<b>III Semester</b>						
1	CS301-T	Advance Data Structure	3	50	2	50
2	CS302-T	Unix Operating System	3	50	2	50
3	CS303-T	PC Maintenance	3	50	2	50
4	CS304-T	Programming in CPP	3	50	2	50
5	CS305-T	Database Management System	3	50	2	50
6	CS306-T	Statistical Method	3	50	2	50
7	CS307-P	Data Structure using CPP	4	100	2	100
8		DBMS	4		2	
9	CS308-P	PC Maintenance	4	100	2	100
10		Unix	4		2	

<b>IV Semester</b>						
1	CS401-T	Software Engg.	3	50	2	50
2	CS402-T	Fedora	3	50	2	50
3	CS403-T	Basic of Networking	3	50	2	50
4	CS404-T	Core Java	3	50	2	50
5	CS405-T	Adv. DBMS	3	50	2	50
6	CS406-T	Web Fundamental	3	50	2	50
7	CS407-P	Java in Fedora OS	4	100	2	100
8		Web Fundamental	4		2	
9	CS408-P	Based in Adv. DBMS and N/w	4	100	2	100
10		Mini Project	4		2	

*Kwaghman*  
 H/C Principal  
 Modern College of Computer Science & I.T.  
 Aurangabad.





Sr. No.	Paper Number	Name of the Paper Titles	Scheme of Teaching	Scheme of Evaluation(Marks)		
			Theory / Practical (Lect./week)	Theory / Practical ( Marks )	Exam Duration ( in hrs.)	Total Mark
<b>V Semester</b>						
1	CS501-T	Software Cost Estimation	3	50	2	50
2	CS502-T	Basic of Android O. S.	3	50	2	50
3	CS503-T	Core Java-II	3	50	2	50
4	CS504-T	Basic of Computer Graphics	3	50	2	50
5*	CS505-T	Beginners Prog. with PHP	3	50	2	50
6*	CS506-T	Basic of ASP.Net	3	50	2	50
7 <sup>#</sup>	CS507-T	Data Mining	3	50	2	50
8 <sup>#</sup>	CS508-T	Advanced Networking	3	50	2	50
9	CS509-P	Pr. Based on Adv. Java	4	100	2	100
10		Pr. Based on Comp. Graphics	4		2	
11	CS510-P	Pr. Based on Android O.S.	4	100	2	100
12		Pr. Based on PHP/ASP.Net	4		2	
<b>VI Semester</b>						
1	CS601-T	Software Quality & Testing	3	50	2	50
2	CS602-T	Android Application Development	3	50	2	50
3	CS603-T	Theory of Computation	3	50	2	50
4	CS604-T	Advanced Computer Graphics	3	50	2	50
5*	CS605-T	Advanced Prog. With PHP	3	50	2	50
6*	CS606-T	Programming Language: C#	3	50	2	50
7 <sup>#</sup>	CS607-T	e-Commerce	3	50	2	50
8 <sup>#</sup>	CS608-T	Ethics and Cyber Law	3	50	2	50
9	CS609-P	Pr. Based on Android Develop.	4	100	2	100
10		Pr. Based on PHP / C#	4		2	
11	CS610-P	Major Project	8	100	4	100
12						

\* and #: Any one paper is to be opted from the group

K. S. Kulkarni  
HC Principal

Modern College of Computer Science & I.T.  
Aurangabad.

9



# B.Sc.(Computer Science)

## Semester -V

*Kalyan*  
Principal  
Modern College of Computer Science & I.T.  
Aurangabad



Course: B.Sc.(C.S.) – V Seme

Paper Code: CS-501

### Software Cost Estimation

#### Unit-I

##### Introduction

Observation on Estimation, Planning process, Software Scope and Feasibility, Types of Resources, Project estimation.

#### Unit-II

##### Decomposition Techniques

Software sizing, Problem-Based Estimation, LOC-Based Estimation with example, FP- Based Estimation with example, Process-Based Estimation with example, Designing Use Cases, Use Cases- Based Estimation with example, Estimate Reconciliation.

#### Unit-III

##### Empirical Estimation Models

Structure of Estimation Model, COCOMO Models, Software Equation, Estimation for Object-Oriented Projects, Estimation for Agile Development, Estimation for Web Projects, Creating a Decision Tree, Outsourcing.

#### Reference Books:

1. Software Engineering a Practitioner's Approach By Roger S. Pressman (Seventh Edition) McGraw Hill
2. An Integrated Approach to Software Engineering, Pankaj Jalote, Narosa

*K. Singh*

HC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



Course: B.Sc.(C.S.) – V Seme

Paper Code: CS-502

### Basic of Android Operating System

**Unit – I**     **Environment Setup:** Setup Java Development Kit (JDK), Android SDK,

Eclipse IDE, Android Development Tools (ADT) Plugin, Create Android Virtual Device, Architecture: Linux kernel, Libraries, Android Runtime, Application Framework.

**Application Components**

Application Components Activities, Services, Broadcast Receivers, Content

Providers, Additional Components, Create Android Application, Anatomy of Android Application, The Main Activity File, The Manifest File, The Strings File, The R File, The Layout File, Running the Application.

**Unit-II**

**Resources Organizing & Accessing:** Alternative Resources, Accessing Resources

**Intents and Filters:** Intent Objects, Action, Android Intent Standard Actions, Data, Category, Extras, Flags, Component Name, Types of Intents: Explicit Intents, Implicit Intents.

**UI Layouts**

Android Layout Types, Relative Layout Attributes, Grid View Attributes, Sub-Activity, Layout Attributes, View Identification, UI Controls, Android

UI Controls, TextView Attributes, AutoComplete Text View Attributes, Button Attributes, ImageButton Attributes, CheckBox Attributes, ToggleButton Attributes, RadioButton Attributes, RadioGroup Attributes.

**Unit-III**

**Event Handling:**

Event Listeners & Event Handlers, Event Listeners Registration, Styles and Themes, Defining Styles, Using Styles, Style Inheritance, Android Themes, Default Styles & Themes, Custom Components, Creating a Simple Custom Components.

**Books & References:**

1) Android Tutorial, Simply Easy Learning by tutorialspoint.com.

Link:[http://www.tutorialspoint.com/android/android\\_tutorial.pdf](http://www.tutorialspoint.com/android/android_tutorial.pdf)

2) Professional Android 4 Application Development :Retomeier, Wrox publication.

*K. Singh*  
HC Principal  
Modern College of Computer Science & I.T.  
Aurangabad.



1. SU-02 B.Sc. Computer Science Sem.- V & VI

- 3) Andriod Apps for Absolute beginners : Wallace Jadson, Apress.
- 4) The Complete Andriod Guide: Kevin Purdy
- 5) Javapoint Tutorial : <http://www.javapoint.com/andriod-tutorial>

*Kwayhmare*

I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.





**Course: B.Sc. (C.S.) – V Seme**

**Paper Code: CS-503**

**Core Java-II**

**Unit – I**

**Input/Output Stream:** File, Directories, FilenameFilter, Byte stream, Character stream, InputStream ,OutputStream ,Working with Reader classes, InputStreamReader, BufferedReader , FileInputStream , FileOutputStream, Writer classes

**Utilities:** Simple Type Wrapper: Number, Character, Boolean,

Enumerations: Dictionary and StringTokenizer, Date, Math :Tramsendentals, Exponential, Rounding function,

**Unit -II**

**Applets :** Introduction to Applet , Types of Applet, Applet vs Application , Applet class, advantages of Applet , Applet Lifecycle, My First Applet, Applet tag, Passing Parameters to Applet .

**Graphics:**Basic Shapes: drawLine, drawArc, fillArc, drawPolygon, fillPolygon, Color & Color Methods, Fonts.

**Unit III**

**Java Database Connectivity (JDBC):** Design of JDBC, JDBC configuration, Executing SQL statement, QueryExecution, Scrollable and updatable resultsets, row sets, metadata, Transaction Processing.

**Networking:** InetAddress, Datagrams, Socket for client and Server, URL, URL Connection.

**Reference Books:**

1. Java Complete Reference, Herbert Schildt, Seventh Edition, Tata McGraw Hill.
2. Java Handbook, Herbert Schildt, Tata McGraw Hill.
3. Java EE 6 for Beginners, Sharanam Shah, Vaishali Shah, Shroff Publishers and Distributors
4. Advanced Java™ 2 Platform How to Program by H. M. Deitel , P. J. Deitel, S. E. Santry  
Prentice Hall publication.

*Keshavnar*  
VC Principal  
Modern College of Computer Science & I.T.  
Aurangabad.



Course: B.Sc.(C.S.) – V Seme

## Basic of Computer Graphics

### Unit-I

#### Basics Concept in Computer Graphics

Introduction to Computer Graphics, Application of Computer Graphics, Classification of Computer Graphics, Types of Graphics Devices, Video Display Devices, Input Devices, Display File and its Structure, Display file Interpreter, Display Processor, Graphics file Format.

#### Graphics in C:

Introduction to graphics in C : initgraph(), detectgraph() and closegraph() function, Drawing object in C , Line, Circle, Rectangle, Ellipse, Changing foreground & background colors, Filling object by color function.,drawpoly, fillpoly, floodfill, getcolor, settext, outtext,style,fonts,coloring.

### Unit-II

#### 2-D Transformation

Translation, Rotation, Scaling, Homogenous Coordinates for Translation, Homogenous Coordinates for Rotation, Homogenous Coordinates for Scaling, Composogation from 2D Transformation, Other Transformation Reflection, Shear, and Inverse Transformation.

### Unit-III

#### Line, Circle and Character Generation

Basics concept in line Drawing, Line Drawing Algorithm, Digital Differential Analyzer, Bresenham's Line Algorithm, Antialiasing of Lines, Method of Antialiasing, Increasing Resolution, Unweighted Area Sampling, Pixel Phasing, Representation of Circle ,Polynomial Method, Trigonometric Method, Circle Drawing Algorithm, DDA Circle Drawing Algorithm, Bresenham's Circle Drawing Algorithm, Character Generation, Stroke Method, Starbust Method, Bitmap Method.

#### Text Books:

1. Procedural Elements for Computer Graphics: D.F.Rogers
2. Mathematical Elements for Computer Graphics: D.F.Rogers and J.A.Adams
3. Computer Graphics : A.P.Godse, ( IIIrd Edition ), Technical Publication

#### Reference Books:

1. Computer Graphics by M. Pauline Baker, Donald Hearn, (2nd Edition) PHI Publication
2. Principles of Interactive Computer Graphics By. William. M. Newman, (IInd Edition) Mc.Graw Hill Publication.
3. Computer Graphics by V.K. Pachghare, (II nd Edition), Laxmi Publication





Course: B.Sc.(C.S.) – V Seme

Beginners Programming with PHP

- Unit-1:** Introduction to PHP: What is PHP? Why PHP? Evolution of PHP. Installation: PHP on windows and Linux, Configuring: Apache & PHP, Running & Testing PHP Script, Combining PHP with HTML. PHP Language Basics: Building blocks of PHP: Variables, Data Types, Operators and Expressions and Constant. Decision within PHP: *if* , *if.. else*, *if.. elseif .. else*, *switch*, Ternary Operator
- Unit – 2:** Looping within PHP: *while*, *do...while*, *for*, *Break* & *Continue* statement Functions in PHP: What is function, why functions, Calling function, Returning Value from function, Recursive function. Arrays in PHP: What & Why Array, Creating Array, Associative Array, Multidimensional Arrays, Accessing Array, Manipulating Arrays, Sorting Arrays, Merging Arrays,
- Unit -3:** Objects in PHP: What is Class & Object, Creating a Class & Object, Object properties, object methods, Overloading, inheritance, Constructor and Destructor. String in PHP: Creating and Accessing String, formatting String, Searching String, Manipulating String. Date and Time: Understanding TimeStamp, Getting Date and time, Extracting values of date-time, Formatting date-time.

Reference Books:

- 1) **Beginning PHP 5.3** , Author: Matt Doyle, Wiley Publishing, Inc.
- 2) **SAMS Teach yourself PHP in 24 hours**, Author: Matt Zandstra, Sams Publishing.
- 3) **"PHP, MySQL and Apache All in One"** , Author: Juliea C. Meloni, SAMS series

*Kwaghmare*  
 VC Principal  
 Modern College of Computer Science & I.T.  
 Aurangabad.



Course: B.Sc.(C.S.) – V Seme

Basic of ASP.Net

UNIT I -

Web designing, web browser, web pages, home page, web site, web servers, world wide web, Concepts of hypertext, hypermedia, versions of HTML, Evolution of .NET, Benefits of .NET Framework, Architecture of .NET Framework, Components of .NET Framework.

UNIT II -

ASP.NET Page Life Cycle, understanding ASP.NET controls, applications, web servers, installation of IIS. Web forms, web form controls, server controls, client controls, adding controls to web form, buttons, text box, labels, checkbox, radio buttons, list box, drop, down list, Ad rotator control. Adding controls a runtime, Running a web application.

UNIT III -

Creating a multiform web project, Form validation: client side and server side validation, Validation controls: Required Field Validator, Range Validator, Comparison Validator, Regular Expression Validator, Custom Validator, Validation Summary, Calendar control.

References:

- 1) .NET 4.0 Programming(6-in-1) Black Book- (Dremtech Press)
- 2) The Completer Reference ASP.NET – Mathew Macdonald (TMH)
- 3) Professional ASP.NET – Wrox publication
- 4) VB.NET Programming Black Book – Steven Holzner (Dreamtech pub.)
- 5) Introduction to .NET framework – Wrox publication.
- 6) ASP.NET Unleashed - bpb publication.

*Kwaghmare*

H/C Principal

Modern College of Computer Science & I.T.,  
Aurangabad.



**Course: B.Sc.(C.S.) – V Seme**

**Paper Code: CS-507**

## **Data Mining**

### **Unit -1**

#### **Data Mining Introduction:**

What is Data Mining?, Definition, DBMS Vs Data Mining, DM Techniques, Issues and Challenges in DM, DM Application Areas, DM Applications-Case Studies, Current Trends Affecting DM, Basic Data Mining Task.

### **Unit – 2**

#### **Association Rule:**

What is an Association rule?, Method to discover Association Rule, Apriori Algorithm, Partition Algorithm.

**Clustering Techniques:** Clustering Paradigm, Partitioning Algorithm, Similarity and Distance Measure, Hierarchical Algorithm.

### **Unit – 3**

**Decision Tree:** What is a decision tree? Tree Construction Principle, Best Split, Splitting indices, Splitting Criteria

**Web Mining:** Introduction, Web Content Mining, Web Structure Mining, Web Usage Mining.

### **Reference:**

1. **Data Mining Techniques** : Arun K. Pujari ,
2. **Data Mining: Introductory and Advanced Topics**: M.H.Dunham  
Pearson Education.
3. **Data Mining: Concepts & Techniques**, Morgan Kaufman. 2006

*Kwaghmare*

I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

Unit I

The OSI reference model: concept of layers, protocols, interfaces, services, TD IP model.

Data Link Layer: Error correction & detection, Types of errors, Detection VS Correction, Block Coding, Linear Block codes (single parity check, hamming codes), Cyclic codes, CRC Encoder & Decoder, CRC Polynomial, Checksum.

Data Link Control & Protocols: Framing, Flow & Error Control, Simplex, Stop-N-Wait, Stop-N-Wait ARQ, Go Back N ARQ, Selective Repeat ARQ, Hybrid ARQ, HDLC

Unit II

Network Layer: Logical addressing, IPv4 Addresses, Classful & Classless addresses, NAT, IPv6 Addressing.

Network layer protocol: Internetworking, IPv4, IPv4 protocol packet format, IPv6 Protocol & Packet format, IPv4 VS IPv6, Transition from IPv4 to IPv6, Address

Resolution protocols: (ARP, RARP), BOOTP, DHCP, Routing Protocols - Delivery, forwarding, routing, types of routing, routing tables, Unicast Routing, Unicast Routing protocols, RIP, Concepts of OSPF, RSP & Multicast Routing

Unit III

Transport Layer: Process to process delivery, UDP, TCP, Congestion Control & Quality of Service: Data traffic, Congestion, Congestion Control (Open Loop, Closed Loop & Congestion control in TCP), QoS and Flow Characteristics.

Application Layer: DNS, Remote Logging(Telnet), SMTP, FTP, WWW, HTTP

References:

1) Data Communication & Networking (Forouzan) , Tom McGraw-Hill Education

IC Principal

Modern College of Computer Science & I.T., Aurangabad.



**Additional Reference:**

- 1) Computer Networks and Internets - Douglas Comer, Prentice Hall
- 2) Computer Networks - Andrew Tanenbaum, Prentice Hall

*Kalyan*  
IC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

1. SU-02 B.Sc. Computer Science Sem.- V & VI



1. ST

**Course: B.Sc.(C.S.)**

**Semester : V**

**Topic: Pr. Based on Adv. Java**

**Paper No.: CS509P (A)**

Minimum 10 Practicals to be performed as per the guidelines of teaching Faculty depending upon all theory units of concerned subject.

**Course: B.Sc.(C.S.)**

**Semester : V**

**Topic: Pr. Based on Computer Graphics  
CS509P (B)**

**Paper No.:**

Minimum 10 Practicals to be performed as per the guidelines of teaching Faculty depending upon all theory units of concerned subject.

**Course: B.Sc.(C.S.)**

**Semester : V**

**Topic: Pr. Based on Android O.S.**

**Paper No.: CS510P (A)**

Minimum 10 Practicals to be performed as per the guidelines of teaching Faculty depending upon all theory units of concerned subject.

**Course: B.Sc.(C.S.)**

**Semester : V**

**Topic: Pr. Based on PHP/ASP.Net**

**Paper No.: CS510P (B)**

Minimum 10 Practicals to be performed as per the guidelines of teaching Faculty depending upon all theory units of concerned subject.

*K. S. Phatak*

HC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

Co-ordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.



# B.Sc.(Computer Science)

## Semester -VI

*K. V. Kulkarni*  
VC Principal  
Modern College of Computer Science & IT,  
Aurangabad.



Course: B.Sc.(C.S.) – VI Seme

Paper Code: CS-601

## Software Quality and Testing

### Unit-I

#### Quality Concepts

Software and Quality, Garvin's Quality Dimensions, McCall's Quality Factors, ISO 9126 Quality Factors, Risk, Quality and Security, SE Methods, Project Management Techniques, Quality Control and Assurance

#### Quality Assurance

Elements of Software Quality Assurance, SQA Task Goals and Matrices, Formal Approach to SQA, Six Sigma for SE, ISO 9000 Quality Standards, SQA Plan.

### Unit-II

#### Software Testing Strategies

Verification and Validation, Picture of Software Testing Strategies, Criteria for complication of testing, Strategies issue, Strategies for Conventional Software and Web Apps, Validation Testing, System Testing, Debugging.

### Unit-III

#### Testing Conventional Applications

Testing Fundamentals, Internal and External view, White-Box Testing, Basic Path Testing, Control Structure Testing, Black-Box Testing, Testing Client-Server Architecture.

#### Testing Web Applications

Dimensions of Quality, Errors within a Web App, Testing Strategy and planning, Testing process, Content Testing, Database Testing, User Interface Testing, Navigation Testing, Configuration Testing, Load Testing, Stress Testing.

### Reference Books:

1. Software Engineering a Practitioner's Approach By Roger S. Pressman (Seventh Edition) McGraw Hill.
2. An Integrated Approach to Software Engineering, Pankaj Jalote, Narosa

*Wajid*  
VC Principal  
Modern College of Computer Science & IT,  
Aurangabad.



Course: B.Sc.(C.S.) – VI Seme

Paper Code: CS-602

### Android Application Development

**Unit I:** **Android SDK Features**  
Access to Hardware including Camera, GPS, and Accelerometer. Native Google Maps, Geocoding, and Location-Based Services. Background Services, SQLite Database for Data Storage and Retrieval, Shared Data and Interapplication Communication, P2P Services with Google Talk, Extensive Media Support and 2D/3D Graphics, Optimized Memory and Process Management, The Dalvik Virtual Machine, Advanced Android Libraries.

**Android Development Tools**  
Types of Android Applications, Hardware-Imposed Design Considerations, Users, Environment, The Android Emulator, Dalvik Debug Monitor Service (DDMS), The Android Debug Bridge (ADB).

**Unit II:** **Applications and Activities:**  
Application Manifest, Manifest Editor, Android Application Life Cycle, Understanding Application Priority and Process States, Externalizing Resources, Fundamental Android

**UI Design:** The Android Widget Toolbox, Layouts, Compound Controls, Custom

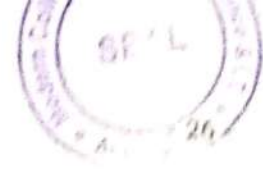
Widgets and Controls, Android Menu System, Activity Menu, Intents, Broadcast Receivers, Adapters, and the Internet: Intents to Launch Activities, Intent Filters to Service Implicit Intents, Intent Filters for Plug-ins and Extensibility, Intents to Broadcast Events, Android-Supplied Adapters, Internet Resource.

**Data Storage, Retrieval, and Sharing**  
Creating and Saving Preferences, Retrieving Shared Preferences, Saving the Activity State, File Management Tools, Databases in Android: SQLite, Cursors and Content Values, Content Providers, Maps, Geocoding, and Location-Based Services: Location Providers, Geocoder, Map-Based Activities.

**Unit III:** **Advanced Development in Android:**

VC Principal  
Modern College of Computer Science & Information Technology  
Bangalore





Controlling Services, Threads, Customizing Toasts, Toasts in Worker Threads, Notification Manager, Triggering Notifications. Peer-to-Peer Communication: Android Instant Messaging, Sending & Listening SMS. Accessing Android Hardware: Media APIs, Controlling Camera Settings, Sensor Manager, Accelerometer and Compass, Android Telephony, Bluetooth, Managing Network and Wi-Fi Connections. Advanced Android Development: Paranoid Android, AIDL to Support IPC for Services, Internet Services, Rich User Interfaces.

**Books & References:**

- 1) Android Tutorial, Simply Easy Learning by tutorialspoint.com.  
Link:[http://www.tutorialspoint.com/android/android\\_tutorial.pdf](http://www.tutorialspoint.com/android/android_tutorial.pdf)
- 2) Professional Android 4 Application Development :Retomeier, Wrox publication.
- 3) Android Apps for Absolute beginners : Wallace Jadson, Apress.
- 4) The Complete Android Guide: Kevin Purdy

Javapoint Tutorial : <http://www.javapoint.com/android-tutorial>

*Kwagh m...*  
WC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



Course: B.Sc.(C.S.) – VI Seme  
603

Paper Code: CS-

## Theory of Computation

### Unit-I

**Introduction:** Sets, relations, functions, graphs, trees, mathematical induction.

**Regular expressions:** FA and regular expression, pumping lemma for regular sets, applications of pumping lemma, closure properties of regular sets, regular sets and grammar, types of grammar (type 0, type 1, type 2, type 3)

### Unit-II

**Finite automata:** definition, transition systems, acceptability of strings, NFA, DFA, equivalence of DFA and NFA, mela moore model, minimization of automaton, Applications.

### Unit-III

Formal Languages, Chomsky classification of languages, languages, their relation and automaton.

### Reference Books

1. J E Hopcroft, R Motwani and J D Ullman, Introduction to Automata theory, Languages and Computation, Pearson Education Asia, 2003.
2. Daniel A Cohen, Introduction to Computer Theory, Hardcover (1990) by John Wiley & Sons
3. K. L.P Mishra, N Chandrashekharan, Theory of Computer Science, PHI 2001
4. Martin John C, Introduction to Language and Theory of computations (TMH) 2004

*K. V. Kulkarni*  
VC Principal  
Modern College of Computer Science & I.T.  
Aurangabad.



**Course: B.Sc.(C.S.) - VI Sem**

**Paper Code: CS-604**

**Advanced Computer Graphics**

**Unit-I**

**3-D Transformation**

Translation, Scaling, Rotation, Shearing, Reflection, Multiple Transformation Projection, Perspective Projection, Parallel Projection, Types of Parallel & Perspective Projection, Vanishing Points, Diffuse Illumination, Specular Reflection.

**Unit-II**

**Curves and Fractals**

Curve Generation, Representation of Parametric & Non-Parametric Curves, Spline Representation Parametric Representation of Circle & Ellipse, Bezier curves, B-Spline curves Fractals, classification of fractals, Topological Dimension, fractal Dimension, Hilbert's curves, Koch curve.

**Unit-III**

**Colour Model and Animation**

Properties of Light, CIE Chromaticity Diagram, Colour Primary Systems, Color Matching Experiments, Colour Models: RGB, CMY and HSV. Introduction of Animation, Animation Using Colour Table, Animation of Wireframe Models.

**Text Books:**

1. Procedural Elements for Computer Graphics: D.F.Rogers
2. Mathematical Elements for Computer Graphics: D.F.Rogers and J.A.Adams
3. Computer Graphics by M. Pauline Baker, Donald Hearn, (2nd Edition) PHI Publication

**Reference Books:**

1. Computer Graphics: A.P.Godse, (3rd Edition), Technical Publication
2. Principles of Interactive Computer Graphics By. William. M. Newman. (1st Edition) Mc.Graw Hill Publication.
3. Computer Graphics by V.K. Pachhare, (1st Edition), Laxmi Publication

*K. Jagtap*  
VC, Principal

Modern College of Computer Science & I.T.,  
Aurangabad.



**Course: B.Sc.(C.S.) – VI Seme**

**Paper Code: CS-605**

**Advanced Programming with PHP**

**Unit-I:** Handling HTML Forms in PHP: Creating HTML Form, Capture Data Sent,

Handling: Empty form data, Multi-Value fields, Validating Form Data, Difference between GET and POST, Global and Environment Variables, Generating Web-form in PHP, Create Multi-step Form, Hidden fields, Redirecting the user.

**Unit – II:** Cookies and user sessions in PHP: State and Stateless Webpage,  
Cookies: Anatomy of cookies, Setting a cookies with PHP,  
Deleting a

cookies, Creating Session Cookies,  
QueryString: Working with QueryString, Creating QueryString.  
Session: Using PHP Session to Store Data: Creating a Session, Reading & Writing Session Data, Destroying a Session, Create a User Login System.

**Unit – III:** Introducing Database and SQL: Basics of MySQL, Connecting to the Database Server, Creating Database, Creating Table.  
Retrieving data: Limit the number of results returned, Order and group results, Query multiple tables at once, Use various MySQL functions and other features to build more flexible queries  
Manipulating data from SQL with PHP: Inserting new records into tables using INSERT statements, changing field values within records with UPDATE statements, deleting records using DELETE statements.

**Reference Books:**

- 1) **Beginning PHP 5.3**, Author: Matt Doyle, Wiley Publishing, Inc.
- 2) **SAMS Teach yourself PHP in 24 hours**, Author: Matt Zandstra, Sams Publishing.
- 3) **“PHP, MySQL and Apache All in One”**, Author: Julica C. Meloni, SAMS series

*K. V. Kulkarni*  
H.C. Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.





1. SU-02 B.Sc. Computer Science Sem.- V & VI

Course: B.Sc.(C.S.) – VI Seme

Paper Code: CS-606

Programming Language: C Sharp

**UNIT I :**

Introduction : Basic Concepts, Features, Common Language Specification

C# Types: Simple type, Struct type, Object type Class type, Interfaces, String type, Arrays , Boxing & unboxing Conversions , Implicits , Explicits , Standard & User Defined Conversions.

**UNIT II :**

Control Statements : Selection Statements – if , Switch, Iteration Statements – For, For-Each, While , Do statements.

Classes & Methods : Constructors & Destructors ,Methods-Parameters, Overriding, Hiding class properties , Indexes , Modifiers, Class member Access, Multi cast delegates

Inheritance & Polymorphism : Inheritance- Basic class & Derived Class , Polymorphism , Base class with Virtual method, Derived class with override methods

**UNIT III :**

Interfaces: Base, body , members , methods , properties , events, indexes, mapping, implementation

Exception Handling : Checked & Unchecked statements, compiler settings for overflow checking , Programmatic overflow checking , Exception handling statements – try & catch , try & finally , try- catch- finally , throwing exception & rethrowing exception

**Reference Books :**

1. C# : A Beginners Guide – Childt , Herbert ( Tata Mcgraw Hill , New Delhi )
2. C# The basics , Vijay Mukhi ( BPB Publications)
3. C# Programming ( Wrox Publications)
4. C# Programming Black Book – Matt Telles (DreamTech Publications)

*K. S. Mahamare*  
H.C. Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



**Course: B.Sc.(C.S.) – VI Seme**

**Paper Code: CS-607**

**E-Commerce**

**Unit-I**

Introduction, IT and business, E-commerce: Concepts Electronic Communication, PCs and Networking, E-mail, Internet and intranets. EDI to E-commerce, EDI, UN/EDIFACT

**Unit-II**

Concerns for E-commerce Growth, Internet bandwidth, Technical issues, Security issues. India E-commerce Readiness, Legal issues, Getting started.

Security Technologies: Encryption, Symmetric key Encryption, Public key encryption, Public key encryption using digital Signatures. Hashing techniques, Certification and key Distribution, Cryptographic.

**Unit-III**

The elements of E-commerce. SSL-Secure Socket Layer, SET-Secure Electronic Transaction Protocol for Credit card payment, E-Cash, E-check, Smart cards.

Electronic Payment System: Digital Cash, Digital Wallets, Digital checking payment systems, Electronic Billing, Wireless payment systems.

Software Package: PGP e-mail encryption software

**Textbook:**

1. E-Commerce: The Cutting Edge of Business, Kamlesh K. Bajaj & Debjani Nag, Tata McGraw Hill.
2. E- Commerce Strategy , Technologies and Applications, David Whiteley, McGraw Hill Edition

**Reference Books:**

1. E- Security, Electronic Authentication and Information Systems Security Sundeep Oberoi, TMG
2. E-Commerce Concepts, Models , Strategies by - G.S.V Murthy
3. E-Commerce- Kenneth C.Laudon and Carol Guercio Traver
4. Internet marketing and E-commerce-Ward Hanson and Kirthi Kalyanram

HC Principal

Course: B.Sc.(C.S.)

Semester : VI

Topic: Pr. Based on Android Development

Paper No.: CS609 P (A)

Minimum 10 Practicals to be performed as per the guidelines of teaching Faculty depending upon all theory units of concerned subject.

Course: B.Sc.(C.S.)

Semester : VI

Topic: Pr. Based on PHP/C#

Paper No.: CS609 P (B)

Minimum 10 Practicals to be performed as per the guidelines of teaching Faculty depending upon all theory units of concerned subject.

Course: B.Sc.(C.S.)

Semester : VI

Topic: Major Project

Paper No.: CS610

Note:

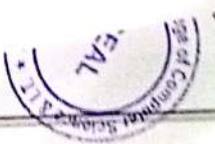
1) It is expected that concerned Faculty is to introduce and make the students aware about the Project Development Environment as well as distribute all the students in group with minimum 2 and maximum 4 student's strength.

Minimum contents of Project Report

1. Introduction
2. Problem definition.
3. System Requirement Specification
  - 3.1. User Interview
  - 3.2. Current System flow diagram
  - 3.3. Proposed System.
4. E-R Diagram
5. DFD
6. Sample Screens
7. Conclusion

*[Signature]*  
Co-ordinator  
Modern College of Computer Science & IT,  
Aurangabad.

*[Signature]*  
H/O Principal  
Modern College of Computer Science & IT,  
Aurangabad.



**Dr. Babasaheb Ambedkar Marathwada University**  
Aurangabad - 431004 (MS) India



**Undergraduate Bachelor Degree Program**  
**in Science (B. Sc.)**  
Environmental Science (Optional Subject)

**Course Structure and Curriculum**  
**(Outcome based Curriculum)**  
Choice Based Credit System  
(Effective from Academic Year 2022-23)

**Dr. Babasaheb Ambedkar Marathwada University**  
Aurangabad – 431004 (MS) India



# INDEX



DR. BABAR

Sr. No.	Contents	Pg. No.
1	Preamble	1-2
2	Course Structure	5-10
3	Vision	
4	Mission	
5	Program Educational Objectives	
6	Program Outcome and Programme Specific Outcomes	
7	Eligibility	
8	Duration	
9	Medium of Instructions	
10	Choice Based Credit System, Credit- to -Contact Hour mapping ...	
11	Attendance	
12	Evaluation Methods / Scheme of Examination, Earning Credits, Grading System	
13	Curriculum: Semester - I	
14	Curriculum: Semester - II	
15	Curriculum Semester - III	
16	Curriculum Semester - IV	
17	Curriculum Semester - V	
18	Curriculum Semester - VI	

*K. Jayaram*  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY



CIRCULAR NO.SU./B.Sc.CBC & GS/11/2022

It is hereby inform to all concerned that, on the recommendation of Faculty of Science & Technology Meeting dated 24.08.2022, the Academic Council at its meeting held on 29 August 2022 has accepted the following Syllabi of B.Sc. Degree under the Choice Based Credit & Grading System along with Rules and Regulation as appended herewith:-

1.	B.Sc.Computer Science (Optional)	Ist and IInd semester
2.	B.Sc.Computer Application (Optional)	Ist and IInd semester
3.	B.Sc.Computer Application (Degree)	Ist and IInd semester
4.	B.Sc.Computer Science (Degree)	Ist and IInd semester
5.	B.Sc.Horticulture (Optional)	Ist to VIth semester
6.	B.Sc.Botany (Optional)	Ist to VIth semester
7.	B.Sc. Agrochemical & fertilizer (Optional)	Ist to VIth semester
8.	B.Sc.Home Science (Optional)	Ist and IInd semester
9.	B.Sc.Automobile Technology (Degree)	Ist and IInd semester
10.	B.Sc.Workshop Technology (Degree)	Ist and IInd semester
11.	B.Sc.Refrigeration and Air Conditioning (Degree)	Ist and IInd semester
12.	B.Sc.Environmental Science (Optional)	Ist and IInd semester
13.	B.Sc.Biotechnology (Degree)	Ist and IInd semester
14.	B.Sc.Biotechnology (Optional)	Ist and IInd semester
15.	B.Sc.Dairy Sci.& Tech (Optional)	Ist and IInd semester
16.	B.Sc.Zoology (Optional)	Ist to VIth semester
17.	B.Sc.Polymer Chemistry (Optional)	Ist and IInd semester
18.	B.Sc.Fisheries Science (Optional)	Ist and IInd semester
19.	B.Sc.Instrumentation Practice (Optional)	Ist semester
20.	B.Sc.Biochemistry (Optional)	Ist and IInd semester
21.	B.Sc.Non Conventional & Conventional Energy (Degree)	Ist and IInd semester

This is effective from the Academic Year 2022-23 and onwards.

All concerned are requested to note the contents of this circular and bring notice to the students, teachers and staff for their information and necessary action.

University Campus,  
Aurangabad-431 004.  
Ref.No. SU/B.Sc./2022/8428-35  
Date:-29.08.2022.

\*\*\*\*\*

*[Signature]*  
Deputy Registrar,  
Academic Section

*[Signature]*  
V.C. Principal  
Modern College of Computer Science & I.T.  
Aurangabad.



1. Preamble  
The course curriculum  
B.Sc. in Information  
part of the main  
As under  
under  
Sc

11211

Copy forwarded with compliments to :-

- 1] The Principal, concerned affiliated College,  
Dr. Babasaheb Ambedkar Marathwada University, Aurangabad,
- 2] The Director, University Network & Information Centre, UNIC, with a  
request to upload this Circular on University Website,

Copy to :-

- 1] The Director, Board of Examinations & Evaluation,
- 2] The Section Officer, [B.Sc. Unit] Examination Branch,
- 3] The Programmer [Computer Unit-1] Examinations,
- 4] The Programmer [Computer Unit-2] Examinations,
- 5] The In-charge, [E-Suvidha Kendra],  
Rajarshi Shahu Maharaj Examination Branch,
- 6] The Public Relation Officer,
- 7] The Record Keeper,

IS\*20082022-

*K. K. Kulkarni*  
IC Principal  
Modern College of Computer Science & IT,  
Aurangabad.





## 1. Preamble

The course curriculum for undergraduate studies under choice based credit system (CBCS) for B.Sc. in Environmental Science is framed in this document. This exercise was undertaken as part of the nationwide curriculum restructuring initiative by the National Education Policy.

As enshrined in the National Education Policy vision of introducing course curriculum for undergraduate studies under Choice Based Credit System (CBCS), the main objective of framing this curriculum of B.Sc. in Environmental Science is to impart the students a holistic understanding of the subject giving substantial weightage to the core contents, skill, value-based and ability enhancement. The syllabus has given due importance on the main streams of the body of knowledge on 'Environment' with due recognition of its wide spectrum. The ultimate goal of the syllabus is to enable the students to have an in-depth knowledge on the subject and enhance their scope of employment at every level of exit. Adequate emphasis has been given on the new and emerging techniques and understanding of the subject under the changing regime and global context.

There is need to strengthen the students to understand essential aspects of environmental science in diverse subject areas such as ecology, environmental chemistry, environmental pollution, environmental geo-science, atmospheric sciences, biodiversity, natural resources management, global warming, climate change and waste management. The curriculum lays focus on creating new knowledge, acquiring new skills and capabilities in Environmental Science producing an intelligent human resource serving the Environment and society, focusing on problem solving critical thinking, team work and collaboration. There is also an additional emphasis in providing opportunities to understand the integration of modern disciplines such as environmental modeling, geographical information systems and remote sensing, environmental sustainability, corporate governance and their applications to environmental sciences. Students would be encouraged to go beyond the classroom and conduct active action-research, research projects, technology based learning and internships in industry/ private/government/manufacturing and service sectors based on suitability. Lectures and classroom sessions are accompanied with on-field visits, industrial visits, seminars, laboratory experiments and in-plant training. Educational visits are an integral part of teaching Environmental Science. These interventions are compulsory and essential aspects of the curriculum. There are optional subject that can be chosen by the students as per their desire and their professional choices. It is hoped that a student with a four years B.Sc. Environmental Science degree, after having the rigor of the courses outlined here, will feel adequately equipped to meet the challenges of career development. At the same time, there is sufficient content for those who wish to continue academic life at the University beyond the under-

graduate level. Due care has been taken to maintain necessary academic wholeness and depth in the course content so that the learning outcomes from these courses will be intellectual growth of a student. The need for a Basic course in Environmental Science is necessitated by our country's requirement and also the acceptability of the subject in our students from the view point of career opportunity. There is a demand for the subject in our country and as Educationists we have a societal obligation to meet such aspirations of the youths. It is equally expected that Environmental Science graduates will significantly contribute to the vision of 'Zero Defect, Zero Effect' policy initiative of Government of India.



*K. Jagtap*  
MC Principal  
Modern College of Computer Science & IT,  
Aurangabad.



## 2. Structure and Curriculum for Bachelor of Science (B. Sc.) Environmental Science (Optional Subject)

(Choice Based Credit System)

Dr. Babasaheb Ambedkar Marathwada University,  
Aurangabad

Choice Based Credit System (CBCS)

Curriculum For

Faculty of Science and Technology

Course Structure and Scheme of

Examination

B.Sc. Three Year Undergraduate Degree Program

Semester I

	Course Code	Course Title	Total periods (Teaching periods/week)	Credits	Scheme of Examination			
					Max Marks	CIA	UA	Min Marks
Optional I (DSC-1A) Core Courses	EVS-111	Core Course (Theory Paper-I) Foundation of Environment	45(3/week)	2	50	10	40	20
	EVS -112	Core Course (Theory Paper-II) Chemical Aspects of Environment	45(3/week)	2	50	10	40	20
	EVS -121	Lab course I (based on EVS -111 and EVS-112)	45(3/week)	1.5	50	10	40	20
Ability Enhancement (compulsory courses) (AECC-1)	XXX-131	Communication skills in English-I	45(5/week)	3	50	10	40	20
	XXX-132	Marathi/Hindi/Urdu/Sanskrit A student can opt for any one of these languages ( SL-I)	45(4/week)	3	50	10	40	20
			225	11.5	250	50	200	100

Total Credits for Semester I : 11.5 ( Theory : 10 ; Laboratory : 1.5 )

## Semester II

	Course Code	Course Title	Total periods (Teaching periods/week)	Credits	Scheme of Examination			Total Marks
					Max Mark	CIA	UA	
Optional I (DSC-1B) Core Courses	EVS-211	Core Course (Theory Paper-III) Natural Resources Management	45(3/week)	2	50	10	40	100
	EVS-212	Core Course (Theory Paper-IV) Solid waste and Hazardous waste management	45(3/week)	2	50	10	40	100
	EVS-221	Lab course II (based on EVS-211 and EVS-212)	45(3/week)	1.5	50	10	40	100
Ability Enhancement compulsory courses (AECC-2)	XXX-231	Communication skills in English-II	45(5/week)	3	50	10	40	100
	XXX-232	Marathi/Hindi/Urdu/Sanskrit A student can opt for any one of these languages (SL-II)	45(4/week)	3	50	10	40	100
Non-Credit Course	XXX-213	Constitution of India	45(3/week)	2*	50			
Non-Credit Course /additional credits	XXX-214	Compulsory Computer Course	45(3/week)	2*	50			
			225	11.5	250	50	200	500

Total Credits for Semester II : 11.5 ( Theory : 10 ; Laboratory : 1.5 )

## Semester III

	Course Code	Course Title	Total periods (Teaching periods/week)	Credits	Scheme of Examination			
					Max Mark	CIA	UA	Min Marks
Optional I (DSC-1C) Core Courses	EVS-311		45(3/week)	2	50	10	40	20
	EVS-312		45(3/week)	2	50	10	40	20
	EVS-321	Lab course 3 (based on EVS-311)	45(3/week)	1.5	50	10	40	20
	EVS-322	Lab course 4 (based on EVS-312)	45(3/week)	1.5	50	10	40	20
Skill Enhancement course (SEC-1)	XXX-313	SEC-1 Any one skill to be chosen out of two SEC-1(A), SEC-1 (B)	45(3/week)	2	50	10	40	20
Ability Enhancement compulsory courses (AECC-3)	XXX-331	Communication skills in English-III	45(5/week)	3	50	10	40	20
	XXX-332	Marathi/Hindi/Urdu/Sanskrit A student can opt for any one of these languages (SL-III)	45(4/week)	3	50	10	40	20
			315	15	350	70	280	140

Total Credits for Semester III : 15 ( Theory : 12 ; Laboratory : 3 )



**Semester IV**

	Course Code	Course Title	Total periods (Teaching periods/week)	Credits	Scheme of Examination			
					Max Marks	CIA	UA	Min Marks
Optional I (DSE-1D) Core Courses	EVS-411		45(3/week)	2	50	10	40	20
	EVS-412		45(3/week)	2	50	10	40	20
	EVS-421	Lab course 4 (based on EVS-411)	45(3/week)	1.5	50	10	40	20
	EVS-422	Lab course 5(based on EVS-412)	45(3/week)	1.5	50	10	40	20
Skill Enhancement course (SEC-2)	XXX-413	SEC-2 Any one skill to be chosen out of two SEC-2(C) , SEC-2 (D)	45(3/week)	2	50	10	40	20
Ability Enhancement	XXX-431	Communication skills in English-IV	45(5/week)	3	50	10	40	20
Compulsory courses (AECC-4)	XXX-432	Marathi/Hindi/Urdu/Sanskrit A student can opt for any one of these languages ( SL-IV)	45(4/week)	3	50	10	40	20
Additional credits		Environmental Studies	45(3/week)	2*	50	10	40	20
			315	15	350	70	280	140

**Total Credits for Semester IV : 15 ( Theory : 12 ; Laboratory : 3 )**

**Semester V**

	Course Code	Course Title	Total periods (Teaching periods/week)	Credits	Scheme of Examination			
					Max Marks	CIA	UA	Min Marks
Optional I (DSE-1A) Discipline Specific Elective	EVS-511		45(3/week)	2	50	10	40	20
	EVS-512		45(3/week)	2	50	10	40	20
	EVS-521	Lab course 6 (based on EVS-511 )	45(3/week)	1.5	50	10	40	20
	EVS-522	Lab course 7 (based on EVS-512 )	45(3/week)	1.5	50	10	40	20
Skill Enhancement course (SEC-3)	XXX-513	SEC-3 Any one skill to be chosen out of two SEC-3(E) , SEC-3 (F)	45(3/week)	2	50	10	40	20
			225	9	250	50	200	100

**Total Credits for Semester V : 9 ( Theory : 06 ; Laboratory : 03)**

  
 W/C Principal  
 Modern College of Computer Science & I.T.  
 Aurangabad.



**Semester VI**

	Course Code	Course Title	Total periods (Teaching periods/week)	Credits	Scheme of Examinations		Total
					Max Marks	CIA	
Optional I (DSE-1 B) Discipline Specific Elective	EVS-611		45(3/week)	2	50	10	40
	EVS-612		45(3/week)	2	50	10	40
	EVS-621	Lab course 8 (based on EVS-611)	45(3/week)	1.5	50	10	40
	EVS-622	Lab course 9 (based on EVS-612)	45(3/week)	1.5	50	10	40
Skill Enhancement course (SEC-4)	XXX-613	SEC-4	45(3/week)	2	50	10	40
		Any one skill to be chosen out of two SEC-4(G), SEC-4 (H)	45(3/week)	2	50	10	40
			225	9	250	50	200

**Total Credits for Semester V : 09 ( Theory : 06 ; Laboratory : 03 )**

**Total Credits for three years : Sem I ( 11.5 ) + Sem II ( 11.5 ) + Sem III ( 15 ) + Sem IV ( 15 ) + Sem V ( 09 ) + Sem VI ( 09 ) = 71 Credits**

3. Vision
4. Mission
5. Program Educational Objectives:
6. Programme Outcomes (POs) and Programme Specific Outcomes:
7. Eligibility:
8. Duration
9. Medium of Instructions
10. Choice Based Credit System (CBCS) and Credit-to-contact hour Mapping:
11. Attendance:
12. Evaluation Methods/ Scheme of Examination, Earning Credits, Grading System
13. Curriculum for Semester I
14. Curriculum for Semester II
15. Curriculum for Semester III
16. Curriculum for Semester IV
17. Curriculum for Semester V
18. Curriculum for Semester VI

*Kwajhmas*  
I/C Principal  
Modern College of Computer Science & I.T  
Aurangabad.

## Template for the designing curriculum of various courses/ papers

Course Code and Course Title

Total Credits: 02

Contact Hours: 30 (Clock Hours)

Marks: 50

Periods: 45 (50 minutes each)

Learning Objectives of the Course

Learning Outcomes of the Course

Unit I : 10 Periods

Unit II: 10 Periods

Unit III: 10 Periods

Unit IV : 10 Periods

Unit V: Tutorials, seminars and Assignments (05 Periods)

References:

Important Notes:

- i) **Nomenclature:** DSC- Discipline Specific Core course, SEC – Skill Enhancement Course, AECC- Ability Enhancement compulsory course, DSE- Discipline Specific Elective, UA- University Assessment ( Semester End), CIA-Continuous Internal Assessment
- ii) **There shall be one skill enhancement course (SEC) III<sup>rd</sup> to VI<sup>th</sup> Semester (any one SEC course to be chosen (any one from three optional subjects) from the basket of SEC courses for the respective semester.**
- iii) **Code description:** EVS code has to be decided by BOS of the respective subject while designing their respective curriculum ( e.g. for Environmental Science it will be EVS)



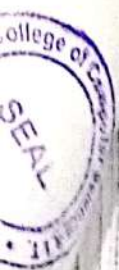
- The codes for first semester courses will start from EVS-111, Second-semester courses will start from EVS-211 and so on

- EVS111 : The first digit indicate the Semester Number, the second two digits indicate papernumbers for the first-semester courses and the same analogy is for the remaining semesters
  - The codes for theory courses will start from EVS -111 ( for the first semester and the same analogy is for the remaining semesters)
  - The codes for practical courses will start from EVS -121 ( for the first semester and the same analogy is for the remaining semesters)
  - The codes for Ability Enhancement compulsory courses will start from EVS -131 ( for the first semester and the same analogy is for the remaining semesters)
- iv) **Assessment:** 80% for University Assessment ( Semester End Examination) and 20 % for Continuous Internal Assessment ( CIA)
- v) **Continuous Internal Assessment (CIA): Theory (10 Marks):** Internal Test 05 Marks (Two Internal Tests of 05 marks each and average of the two test will be considered) and 05 Marks for Assignment/tutorials.
- vi) **Continuous Internal Assessment ( CIA): Practical (10 Marks):** 07 Marks for Internal Practical Examination and 03 Marks for record book/submission of collection and field survey report and excursion report
- vii) **Practical examination :** Annual examination



Course Code  
Student ID

*K. S. Kulkarni*  
VC Principal  
Modern College of Computer Science & I.T.  
Aurangabad.



**B. Sc. I Year Semester I**  
**Core Course (Theory Paper-I)**  
**EVS- 111: Foundation of Environment**



**Course Objectives**

Students will be able to know

1. Dynamics of ecosystems, energy flow in ecological system, nature of a biotic and biotic components and stability concept of ecosystem.
2. Various types of degraded ecosystems, ecological succession, concept of climax and role of pioneer's species in restoration of ecosystems.
3. Population dynamics, prey predator relationship, concept of community, community competition and ecological sustainability.
4. Nature and status of renewable and non-renewable resources, mineral resources, fishery resources, energy resources and recycle, reuse and recovery of these resources.

**Unit-I: - Ecosystem Dynamics: (10)**

Concept of ecosystem, A biotic and biotic components, Energy in ecological system, Concept of productivity, Energy flow in ecosystem, Food chain, Food web, Ecological pyramids, Biogeochemical cycles of nitrogen, oxygen and carbon.

**Unit –II: Ecological succession (10)**

Types of ecological succession, Mechanism of succession, Concept of climax, Concept of Gaia hypothesis. Concept of habitat, Ecological niche, Guild, concept of ecotone, Edge effect, Significance of ecological adaptation, Ecological adaptation in plant- Hydrophytes, Xerophytes, Mesophytes and Halophytes.

**Unit-III:-Restoration of Degraded Ecosystems: (10)**

Degraded ecosystems such as, Forest, grassland, Desert ecosystem, Lentic and Lotic ecosystems, Coastal ecosystems, etc., Role of pioneer species in restoration, Major biomes of world.

**Unit-IV: - Population and Community Ecology: (10)**

Concept of population ecology, Population dynamics, Characteristics of population: Natality, Mortality, Fecundity, Density, Age distribution, Prey predator Relationship, Population explosion: Concept of community, Interspecific and intraspecific competition, Concept of carrying capacity.

**Unit-V: Tutorials, seminars and Assignments (05)**

## Course Outcome



Students should able to:

1. Define ecological systems and its functionality along with stability concept of ecosystem
2. Describe various types of pioneer species and their role in restoration of ecosystems.
3. Recognize ecological succession, concept of climax and degraded ecosystem.
4. Examine nature and status of renewable and non renewable energy resources, mineral resources and energy resources.

## References

1. Fundamentals of Ecology – E.P. Odum, Revised Edition 1995-96
2. Principles of Ecology – P.S. Verma, V.K. Agarwal, S. Chand and Co. Delhi.
3. Principles of Environmental Science – Wart K.E.F. (1973) McGraw Hill Book Company.
4. Basic Ecology – E.P. Odum
5. Concept of Ecology – E.J. Koromondy, 1996, concept of modern biology series, prentice Hall.
6. Modern Concepts of Ecology – H.D. Kumar
7. Principles of Environmental Biology – P.K.G. Nair, Himalaya pub. House, Delhi
8. Environmental Biology – P.D. Sharma, Rastogi Publication, Meerut.
9. Ecology and Environment - P.D. Sharma, Rastogi Publication, Meerut.
10. Basic concepts of soil science – A.K. Kolay, Willey eastern ltd., New Delhi.
11. Environmental Science – Enger, Smith, Smith, W.M.C. Brown company publishing
12. Practical Method in Ecology – R.K. Trivedi, P.K. Goel and Trisal., Enviro Publication, Karad.
13. Chemical methods for Environmental Analysis Water and sediments – R.Ramesh, M. Anbu. Macmillan India Ltd. New Delhi.
14. Fundamental of Ecology – Dash M.C. Tata McGraw Hill Pub. Co. Ltd. NewDelhi.
15. Concepts of Ecology (Fourth Edition)- Edward J. Koromondy, Prentice Hall of India Pvt. Ltd. New Delhi.
16. Environment forest, ecology and man – Dixit R.K. Rastogi Publication, NewDelhi.
17. Environment, energy, health planning for conservation – V. Vidyathath, Gyan Publishing House, New Delhi
18. Air pollution-M.N. Rao
19. Air pollution- A.C. Stern, Academic press Vol. I-X.
20. Air pollution-V.P. Kudesia.
21. Air pollution control-NEERI
22. Air pollution-Magill Holder and Ackely
23. Water pollution-A.K. Tripathi and S.N. Pande
24. Waste water engineering, treatment, disposal and reuse-Metcalf and Eddy.
25. water supply and sanitary engineering-R.C. Rangwala

**B. Sc. I Year Semester I**  
**Core Course (Theory Paper-II)**  
**EVS-112: Chemical Aspect of Environment**

**Course Objectives**

Students will be able to know

1. Understand the basics concepts of Chemistry
2. Acquire the knowledge of composition of Air, Water & Soil
3. Identify the chemical aspects of Environment.
4. To analyze processes for Air, Water & Soil

**Unit-I: -Basic Concepts of Environmental Chemistry:** (10)

Energy-definition, types (kinetic and potential), Forms of energy: Laws of thermodynamics (First & Second), Stoichiometry, Gibbs energy, Chemical potential, chemical equilibrium, Acid-base reactions. Solubility product, Solubility of gases in water.

**Unit-II: - Chemical Agents in Environment:** (10)

Introduction, definition, Scope, Importance , Role of chemical agents in environment, Basic water chemistry, Impurities, Basic principles and sources, Gases solubility in water, Heat influencing chemical reactions, Solubility of impurities, Characteristics of sanitary spent water, Concentration, Normality, Molarity, concept of dilution , Serial dilution, Single step and multiple step dilution, Sample collection guidelines, Sample preservation , Sample order.

**Unit-III: Chemistry of Air :** (10)

Classification of elements, Composition of air, Chemical speciation, particles, Ions and radicals in the atmosphere, Chemical processes for formation of inorganic and organic particulate matter, Toxic chemicals in environment, Pesticides, Insecticides, Arsenic, Cadmium, Lead, Mercury, Carbon monoxide and Ozone, MIC and other carcinogens in air and water. Chemistry of Ozone layer, Ozone layer depletion. Causes and effects. Greenhouse effect: Major greenhouse gases, Causes and effects. Global Warming, Causes and effects.

**Unit -IV: - Chemistry of Water and Soil:** (10)

Chemistry of water, Structure of water molecule, Solubility of compounds in water, Dissociating constant, Water quality parameters and standards, Chemistry of soil, Composition of soil, Biogeochemical cycles (nitrogen, oxygen, carbon, Sulphur, phosphorus etc.), Micronutrients of soil, Factors effecting the soil quality, Adsorption of contaminant in soil, Toxic chemicals present in soil.

**Unit V: Tutorials, seminars and Assignments** (05)





### Course Outcome

Students should be able to:

- Define basic aspects of environment
- Explain chemical contamination in the environment
- Apply the knowledge of chemistry to analyze air, water and soil quality
- Evaluate the level of pollution in environment

### References

1. Environmental Chemistry- G.S. Sodhi.
2. Environmental Science –S.C.Santra
3. Environmental Chemistry- S. E.Mannhan
4. Environmental Chemistry – A.K. De
5. Environmental Chemistry-A global perspective; G.W. Vantoon and S.J. Duffy, Oxford Uni. Press, London.
6. Environmental chemistry – B.K. Sharma
7. Environmental chemistry – B.K. Sharma and H. Kaur
8. Environmental pollution analysis – S.M. Khopkar
9. Environmental chemical analysis – Lanin L. Marr, Malcom S.
10. Environmental Chemistry – Kanan Krishnan.
11. Environmental Chemistry – S.K. Banerjee.
12. Environmental Chemistry – J.W. Moore and E.A. Moore.
13. Destruction of hazardous chemicals in the laboratory: G. Lunn and E.B. Sansone.
14. A text book of Environmental Chemistry and pollution control – S.S. Dara.
15. Environmental Chemistry – M. Satake, Do. S. Sethi, S.A. Eqbal.
16. Environmental and Man: The chemical environment: J. Lenihan and W.W. Fletcher.
17. Environmental Chemistry – S.S.Dara

*Kwaghmare*

I/C Principal  
Modern College of Computer Science & I.T.  
Aurangabad.

B. Sc. I Year Semester I

EVS-121: Lab Course- 1

(Practical paper based on paper EVS-111 and EVS-112)



1. To study the 'Laboratory Safety Rules'.
2. To study the cleaning methods of glass wears.
3. To study the First-Aid and emergency treatment in laboratory.
4. Collection and Preservation of phytoplankton and zooplankton samples from different Water bodies (river, pond, Lake etc)
5. The qualitative study the phytoplankton's (any 10 specimens).
6. The qualitative study the zooplanktons (any 10 specimens).
8. Collection of hydrophytes, xerophytes, mesophytic and halophytic plants / animals Specimens.
9. Study of xeric adaptation in plants, morphometrically and histologically.
10. Study of xeric adaptations in animal (at least 5 specimen's morphometrically)
11. Study of mesophytic specimens (at least 5 specimens).
12. To study the laboratory equipments and instruments (Oven, Microscope, Incubator, Inoculation chamber, Autoclave, Electronic balance, pH meter, Colorimeter, Turbidity meter, etc).
13. To study the preparation of regents of different Normality and Molarities (i.e. 1 N, 0.1N, 1M, etc).
14. Study of various equipments used in air pollution.
15. Detection of SO<sub>2</sub> gas and its effect on plants.
16. Detection of NH<sub>3</sub> gas and its effect on plants.

Note:

- i) Duration for each practical is of 04 periods.
- ii) Study tour /field visits are compulsory.



**B. Sc. I Year Semester II**  
**Core Course (Theory Paper-III)**  
**EVS- 211: Natural Resources Management**



Refer

**Unit I: Natural Resources:** (10)

Definition; Classification; Concept of renewable and nonrenewable resources; their conservation and importance, Role of Individuals and NGOs in Resource Conservation: Environmental movements such as 'Chipko', Western Ghats, and Silent valley, Narmada, Project agitation etc.; Role of individuals and NGO's in natural resource conservation.

**Unit II: Energy Resources:** (10)

Renewable and non-conventional energy resources like solar, wind, geothermal, tidal and wave energy, biomass, biogas and biodiesel, hydroelectric energy; Atomic energy, non-renewable and conventional energy resources like coal, petroleum, fuel gases; Environmental impacts of energy exploitation, Energy conservation.

**Unit IV: Forest and Wildlife Resources:** (12)

Importance of forests and wildlife; Types of forest resources; Overexploitation of forests; Deforestation; Forest management and conservation; Wildlife conservation; National parks and sanctuaries: Biosphere reserves.

**Unit IV: a) Water Resources and conservation:** (10)

Water resources on the earth; Consumption and uses of water; Management and conservation of water resources; Rain water harvesting, drip irrigation.

**b) Mineral and Soil Resources:**

Types and Importance of minerals and soil; Important minerals of India; Mineral extraction and environmental problems; Conservation of mineral resources; Reclamation of mining areas. Soil erosion, conservation of soil.

**Unit V: Tutorials, seminars and Assignments** (05)

*Kwaghmare*  
I/C Principal  
Modern College of Computer Science & Information Technology  
Aurangabad.

### References:

1. Environmental Chemistry – B.K.Sharma
2. Ecology and Environment – P.D Sharma
3. Geography of India – Majid Hussain
4. Environmental Studies- Arun K.Tripathi
5. Environmental Geography- Savindra Singh
6. Oceanography- Savindra Singh
7. Environmental studies -Erach Bharucha
8. Environmental studies –Irani Dipti
9. Craig, J.R., Vaughan, D.J. & Skinner, B.J. 1996. Resources of the Earth: Origin, Use, and Environmental Impacts (2nd edition). Prentice Hall, New Jersey.
10. Freeman, A.M. 2001. Measures of value and Resources: Resources for the Future. Washington DC.
11. Freeman, A.M. 2003. Millennium Ecosystem Assessment: Conceptual Framework. Island Press.
12. Ginley, D.S. & Cahen, D. 2011. Fundamentals of Materials for Energy and Environmental Sustainability. Cambridge University Press.
13. Klee, G.A. 1991. Conservation of Natural Resources. Prentice Hall Publication.
14. Miller, T.G. 2012. Environmental Science. Wadsworth Publishing Co.
15. Ramade, F. 1984. Ecology of Natural Resources. John Wiley & Sons Ltd.
16. Tiwari, G.N. & Ghosal, M. K. 2005. Renewable Energy Resources: Basic Principles and Application. Narosa Publishing House.



*Kwaghmar*  
I/C Principal  
Modern College of Computer Science & I.T.  
Aurangabad.

B. Sc. 1 Year Semester II  
Core Course (Theory Paper-IV)  
EVS- 212: Solid and Hazardous waste management



**Unit I- Introduction**

(10)

Introduction to MSW, Composition and Waste characteristics of MSW, Collection, Segregation and Transfer Operation, Waste system, current scenario, MSW generation in India, Model for appropriate waste collection and segregation, reference model, mode of collection, micro-route planning and maps, transfer stations, Management and Handling Rules of MSW.

**Unit II- Treatment Method for MSW**

(10)

1. Anaerobic Digestion, 2. Aerobic Digestion, 3. Vermi composting, 4. Incineration, 4) Mass Burn and Refuse-Derived Fuel, 5. Waste To Energy (WTE), Dioxin and furans, heavy metals, 6. Landfill (Basic Landfill Constructions and operations, Decomposition and phases in Landfill) Types landfills (Secured Landfill, Sanitary Landfill).

**Unit III- Integrated Solid Waste Management**

(10)

Source Reduction, Green, Material Selection, Product System Life Extension, Material Life Extension, Reduced Material Intensiveness, Process Management, Efficient Distribution, Eco-labels, Lifecycle Assessment, The 5 R's-Reduce, Recycle (Paper & Paperboard, Plastics, Glass Containers, Aluminum), Reuse, Remanufacture, Recover (Energy Recovery & Material Recovery)

**Unit- IV- Hazardous waste Sources and Management**

(10)

Hazardous Waste Management: Definition and identification of hazardous wastes-sources and characteristics – hazardous wastes in Municipal Waste – Hazardous waste regulations –minimization of Hazardous Waste-compatibility, handling and storage of hazardous waste-collection and transport, e- waste -sources, collection, treatment and reuse management. Hazardous waste treatment: Hazardous waste treatment technologies, Biomedical Waste management: Biomedical (Handling and Management) Rules 2008, sources and disposal.

**Unit-V- Tutorials, seminars and Assignments**

(05)

*Kaushik*  
HC Principal  
Modern College of Computer Science & IT  
Aurangabad

## References

1. George Tchobanoglous et al., "Integrated Solid Waste Management", McGraw-Hill Publishers, 1993. 177
2. B. Bilitewski, G. HardHe, K. Marek, A. Weissbach, and H. Boeddicker. "Waste Management", Springer, 1994.
3. Municipal Solid Waste Management – N. N. Bandela, D.G. Tare, B.R. Publishing Corporation, 2009
4. Manual on Municipal Solid Waste Management, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2000
5. R.E. Landreth and P.A. Rebers, "Municipal Solid Wastes – problems and Solutions". Lewis Publishers, 1997.
6. Bhide A.D. and Sundaresan, B.B., "Solid Waste Management in Developing Countries", INSDOC, 1993.
7. George Tchobanoglous et al., "Integrated Solid Waste Management". McGraw-Hill Publishers, 1993. 177
8. B. Bilitewski, G. HardHe, K. Marek, A. Weissbach, and H. Boeddicker. "Waste Management", Springer, 1994.
9. Manual on Municipal Solid Waste Management, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2000
10. R.E. Landreth and P.A. Rebers, "Municipal Solid Wastes – problems and Solutions". Lewis Publishers, 1997.
11. Bhide A.D. and Sundaresan, B.B., "Solid Waste Management in Developing Countries", INSDOC, 1993.
12. Gilbert Masters, "An Introduction of Environmental Engineering", McGraw-Hill Publishers.
13. Dr. P.K. Behra, Dr. S.K. Sahu and M.S. Shivarama, "Encyclopedia of Hazardous Waste Management", Dominate Publishers and Distributers.

*Kwaghmare*  
V/C Principal  
Modern College of Computer Science & IT

B. Sc. I Year Semester II  
EVS-221: Lab Course- 2  
(Practical paper based on paper EVS-211 and EVS-212)

1. Measurement of Electrical Conductivity.
2. Determination of Total Hardness.
3. Determination of Dissolved Oxygen.
4. Determination of Alkalinity
5. Determination of Free CO<sub>2</sub>
6. Determination of Turbidity.
7. Determination of soil Temperature.
8. Determination of Soil Moisture
9. Determination of soil pH.
10. Determination of organic matter in soil .
11. Monitoring wind speed and direction.
12. To study the Vermicomposting bed.
13. Determination pH & Electrical conductance of Municipal solid waste.
14. Determination of Moisture content of municipal solid waste.
15. Determination of potassium of Municipal solid waste.
16. Percent composition study of solid waste for organic and inorganic matter.



**DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY,  
AURANGABAD.**



**Circular /Acad Sec./Curriculum-12(7)/HF/CBCS-BA-II Yr/ 01/2023.**

It is hereby inform to all concerned that, on the recommendation of Dean, Faculty of Humanities; **the Hon'ble Vice-Chancellor has accepted the following subject wise Curriculum of Choice Based Credit & Grading System** under the faculty of Humanities in his emergency powers under Section 12 [7] of the Maharashtra Public University Act, 2016 on behalf of the Academic Council.

Sr. No.	UG Subject wise Curriculum	Semesters
01.	B. A./B.Com/ B.Sc./BFA/BSW Second Language & Optional Second Year [Marathi]	IIIrd & IVth
02.	B. A./B.Com/ B.Sc./BFA/BSW Second Language & Optional Second Year [Hindi]	IIIrd & Ivth
03.	B. A./B.Com/ B.Sc./BFA/BSW Second Language & Optional Second Year [Urdu]	IIIrd & Ivth
04.	B.A./ B.Com/ B.Sc. Second Language & Optional Second Year [Sanskrit]	IIIrd & Ivth
05.	B. A. Second Year [Political Science]	IIIrd & Ivth
06.	B. A. Second Year with Model College [Economics]	IIIrd & Ivth
07.	B. A. Second Year [History]	IIIrd & Ivth
08.	B. A. Second Year for Model College [Sociology]	IIIrd & Ivth
09.	B. A. Second Year [Public Administration]	IIIrd & Ivth
10.	B. A. Second Year [Military Science]	IIIrd & Ivth
11.	B. A. Second Year [Philosophy]	IIIrd & Ivth
12.	B.A./ B.Com/ B.Sc. Second Year Optional [National Cadet Corps (NCC)]	IIIrd & Ivth

**This is effective from the Academic Year 2023-24 and Onwards as per appended herewith.**

All concerned are requested to note the contents of this circular and bring notice to the students, teachers and staff for their information and necessary action.

University campus,  
Aurangabad 431 004.  
Ref. No. SU/Col. /UG/CBCS/ B.A.  
II Yr/FH/ 2023/ 363)-5]

}}  
}}  
}}  
}}  
\*\*\*\*\*

**Deputy Registrar,  
Academic.**

Date: 03.07.2023.

**VC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.**



**Copy forwarded with compliments to:-**

- 1] **The Principal, all affiliated colleges,**  
Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.
- 2] **The Principal, Model college,**  
Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.
- 3] **The Director, University Network & Information Centre, UNIC,**  
with a request to upload this Circular on University Website.

**Copy to :-**

- 1] **The Director, Board of Examinations & Evaluation,**
- 2] **The Section Officer, [B.A.,B.Com, B.Sc. Unit] Exam. Branch,**
- 3] **The Section Officer, [Eligibility Unit],**
- 4] **The Programmer [Computer Unit-1] Examinations,**
- 5] **The Programmer [ Computer Unit-2] Examinations,**
- 6] **The In-charge, [E-Suvidha Kendra],**
- 7] **The Public Relation Officer,**
- 8] **The Record Keeper,**  
Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.

-\*\*\*-

Drk\*030723/-

*K. V. Kulkarni*  
 VC Principal  
 Modern College of Computer Science & I.T.  
 Aurangabad.

**DR. BABASAHEB AMBEDKAR  
MARATHWADA UNIVERSITY,  
AURANGABAD.**



Curriculum of

**B. A./ B.Com./ B.Sc./ B.F.A./ B.S.W.**

**Second Year (S.L. & Opt.)**

**[Marathi]**

**Semester-III & IV**

**'under Choice Based Credit & Grading System Pattern'**

**Implemented at College**

**Level**

**[ Effective from the Academic Year 2023-24 & Onwards]**

*Kusayhmare*

I/C Principal

Modern College of Computer Science & I.T.  
Aurangabad.





डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद

बी.ए./बी.एस्सी., द्वितीय वर्ष, सत्र-तिसरे

CBCS पद्धतीनुसार जून २०२३ पासून लागू

अभ्यासपत्रिका ३ री - भारतीय भाषा : मराठी (भाग-३ रा)

संकेतांक - AECC-3 Marathi

तासिका-५७ तास-४५ श्रेयांक - ०३ गुण-५० (लेखी परीक्षा-४०, प्रात्यक्षिक-१०)

उद्दिष्टे :

१. विद्यार्थ्यांच्या मनात निवडक वेच्याच्या परिशीलनाने मूल्यात्मक वाढ होईल.
२. रसास्वाद क्षमता वाढीस लागेल.
३. विवेकवादाची व वैज्ञानिक दृष्टिकोनाची कास धरण्यास मदत होईल.
४. लेखनातील विविध प्रवृत्ती व प्रकृती समजण्यास मदत होईल.
५. सृजनशील लेखनाकरिता उद्युक्त करण्यास मदत होईल.

अ.क्र	घटक	अभ्यासक्रमाचा तपशील	श्रेयांक	तास
१	गद्य विभाग	१. हसा आणि लड्डू व्हा - निर्मलकुमार फडकुले २. बहुजन समाजाचे शिक्षण - भा.ल. भोळे ३. ऐसे जयाचे पाईक बळिया - किशोर सानप ४. रमाई - यशवंत मनोहर ५. निरोप - राजकुमार तांगडे ६. काकणचोळी - अनिता यलमटे	१	१५
२	पद्य विभाग	१. सागरास - स्वातंत्र्यवीर वि.दा. सावरकर २. कुणाच्या खांद्यावर - आरती प्रभू ३. आवाहन - दत्ता हलसगीकर ४. महापुरूषा ! - हिरा बनसोडे ५. बियाणं - नागनाथ पाटील ६. मराठी माती - वा.ना. आंधळे ७. पिंपळखोपा - निशिकांत आलटे ८. सुगंधी बाग आहे ती - शेख आबिद ९. झेप - उर्मिला चाकूरकर १०. अतिक्रमण - विशाल इंगोले ११. बिरसाईता - सखाराम डाखोरे १२. आळवण - विकास जगताप	१	१५
३	उपयोजित मराठी	१. वृत्तसकलन व निवेदन २. चॅटजीपीटी ३. सदर लेखन ४. सारांश लेखन	०.५	०८
४	प्रकल्प	संबंधित प्राध्यापकांनी विद्यार्थ्यांकडून विषयानुकूल प्रकल्प पूर्ण करून घ्यावेत.	०.५	०७

*Kwaghmare*  
IIC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

*स.प.*  
(राजेराम जिगे)  
अध्यक्ष, मराठी अभ्यास मंडळ



डॉ. बाबासाहेब आंबेडकर महलवाडी विद्यापीठ, औरंगाबाद,  
 बी.कोर, बी.एच.एच.पू., बी.एच.ए., द्वितीय वर्य, सप्त-तिल्ले  
 CECS महाराष्ट्र शासन २०२३ मसुदा लागू  
 अभ्यासक्रमांतिका ३ वी - भारतीय भाषा : मराठी (भाग-३ ए)



वैक्यांतिक - **AECC-3 Marathi**

तासिका - ४४ तास - ४४ क्षेत्रांक - ०३ गुण - १०० (सोबी मरीसा - ४०, प्रात्यक्षिक - २०)

शेवट

- १. विद्यार्थ्यांच्या मनात निरवकाश वेगवेगळ्या मरीसांतल्याने मृत्यूपासून वाचू शकते.
- २. समाजात समता वाढवणे गरजेचे.
- ३. क्षेत्रांतल्या सौंदर्याचा व वैयक्तिक सुखीकरणाने काम करावयास मनात येईल.
- ४. वेगवेगळ्यात वेगवेगळे प्रकृत्ये व प्रकृत्ये वाचण्यास मनात येईल.
- ५. मृत्यूपासून वेगवेगळ्यात श्रद्धा वाचण्यास मनात येईल.

अ.क्र.	मरीसा	अभ्यासक्रमाच्या तपसाल	अंकांक	तास
०१	मराठी	१. लला आंबेडकर यांचे - विवेकानंद यांचे चरित्र २. मृत्यूपासून वेगवेगळे क्षेत्रांत - भा.प्र. मरीसा ३. क्षेत्रांतल्या सौंदर्याचा व वैयक्तिक सुखीकरणाने काम करावयास मनात येईल. ४. वेगवेगळ्यात वेगवेगळे प्रकृत्ये व प्रकृत्ये वाचण्यास मनात येईल. ५. मृत्यूपासून वेगवेगळ्यात श्रद्धा वाचण्यास मनात येईल.	१०	४४
०२	मराठी	१. समाजात - समाजातल्या वेगवेगळ्या कामकाज २. लला आंबेडकर यांचे चरित्र - अखेरचा प्रश्न ३. अखेरचा प्रश्न - लला आंबेडकर यांचे चरित्र ४. मृत्यूपासून वेगवेगळे क्षेत्रांत - भा.प्र. मरीसा ५. क्षेत्रांतल्या सौंदर्याचा व वैयक्तिक सुखीकरणाने काम करावयास मनात येईल. ६. वेगवेगळ्यात वेगवेगळे प्रकृत्ये व प्रकृत्ये वाचण्यास मनात येईल. ७. मृत्यूपासून वेगवेगळ्यात श्रद्धा वाचण्यास मनात येईल. ८. समाजात - समाजातल्या वेगवेगळ्या कामकाज ९. लला आंबेडकर यांचे चरित्र - अखेरचा प्रश्न १०. अखेरचा प्रश्न - लला आंबेडकर यांचे चरित्र ११. मृत्यूपासून वेगवेगळे क्षेत्रांत - भा.प्र. मरीसा १२. क्षेत्रांतल्या सौंदर्याचा व वैयक्तिक सुखीकरणाने काम करावयास मनात येईल. १३. वेगवेगळ्यात वेगवेगळे प्रकृत्ये व प्रकृत्ये वाचण्यास मनात येईल. १४. मृत्यूपासून वेगवेगळ्यात श्रद्धा वाचण्यास मनात येईल.	१०	४४
०३	अभ्यासक्रमांतिका मराठी	१. मृत्यूपासून वेगवेगळे क्षेत्रांत - भा.प्र. मरीसा २. क्षेत्रांतल्या सौंदर्याचा व वैयक्तिक सुखीकरणाने काम करावयास मनात येईल. ३. वेगवेगळ्यात वेगवेगळे प्रकृत्ये व प्रकृत्ये वाचण्यास मनात येईल. ४. मृत्यूपासून वेगवेगळ्यात श्रद्धा वाचण्यास मनात येईल.	१०	४४
०४	प्रकृत्ये	कवित्यात प्रकृत्यांचे वेगवेगळे क्षेत्रांतल्याने मृत्यूपासून वाचू शकते.	१०	४४

Handwritten signatures and stamps at the bottom right of the page, including the name of the Principal and the date.



डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद.

बी.ए. द्वितीय वर्ष, सत्र - तिसरे

CBCS पद्धतीनुसार जून २०२३ पासून लागू

मराठी (ऐच्छिक) - अभ्यासपत्रिका ५ वी

मध्ययुगीन मराठी वाङ्मयाचा इतिहास : आरंभ ते १५९९

संकेतांक - CC-2C(5) Marathi

तासिका-५७ तास-४५ श्रेयांक - ०३ गुण-५० (लेखी परीक्षा-४०, प्रात्यक्षिक-१०)

उद्दिष्टे :

१. मराठी वाङ्मयाचा प्रारंभकाल समजून घेण्यास मदत करणे.
२. मध्ययुगातील प्रारंभीची कविता व गद्य वाङ्मय लक्षात आणून देणे.
३. मध्ययुगातील महत्त्वाचे संप्रदाय व काही प्रवाह त्यांच्या प्रकृतीसह लक्षात घेण्यास मदत करणे.
४. मध्ययुगातील सामाजिक व राजकीय परिस्थिती समजून घेण्यास मदत होईल.
५. मध्ययुगातील विविध प्रकारच्या लेखनापाठीमागील प्रेरणा समजून घेण्यास मदत होईल.

अ.क्र	घटक	अभ्यासक्रमाचा तपशील	श्रेयांक	तास
१	प्रारंभकाल व आद्यकवी मुकुंदराज	१. महाराष्ट्रनामाभिधान उपपत्ती २. मराठी भाषेची पूर्वपीठिका ३. आद्यकवी मुकुंदराज व त्यांची ग्रंथसंपदा	०.५	०८
२	महानुभाव संप्रदाय व त्यांचे साहित्य	१. महानुभावपथाचे तत्त्वज्ञान २. सर्वज्ञ चक्रधर व समकालीन महाराष्ट्र ३. महानुभावांचा आचारधर्म ४. महानुभावांचे गद्य वाङ्मय ५. महानुभावीय पद्य रचना	१	१५
३	वारकरी संप्रदाय व संत साहित्य	१. संत ज्ञानदेव व संत नामदेव २. संत नामदेवांची प्रभावळ ३. संत नाथपूर्वकालीन कान्होपात्रा व दासोपंत ४. संत एकनाथ व त्यांचा वाङ्मयीन आविष्कार ५. नाथ समकालीन काही महत्त्वपूर्ण कवी (त्र्यंबकराज, शिवकल्याण, रमावल्लभदास, विष्णुदासनामा, कृष्णदास मूद्गल) ६. जैन, वीरशैव, ख्रिस्ती व मुस्लिम धर्मीय कवींच्या रचना ७. संत तुकाराम	१	१५
४	प्रकल्प	मध्ययुगीन संतांची व महानुभावपंथीयांची चरित्रे संकलित करणे, मध्ययुगीन कलाकृतीचे परीक्षण, दोन संप्रदायातील तुलना, महाविद्यालयातील प्राध्यापकांनी विषयानुरूप अन्य विषय येथे प्रकल्प लेखनासाठी देणे अभिप्रेत आहे.	०.५	०७

संदर्भ ग्रंथ :

१. ढेंगे रा. चिं. - प्राचीन मराठीच्या नवधारा - मोघे प्रकाशन, कोल्हापूर
२. देशपांडे अ.ना. - प्राचीन मराठी वाङ्मयाचा इतिहास, व्हीनस प्रकाशन, पुणे
३. नसिराबादकर ल.रा. - प्राचीन मराठी वाङ्मयाचा इतिहास, फडके प्रकाशन, कोल्हापूर
४. प्रा. सुग्राम पुल्ले - महानुभाव आणि वारकरी साहित्याचे अंतरंग, इसाप प्रकाशन, नांदेड
५. भावे वि.ल. - महाराष्ट्र सारस्वत, पॉप्युलर प्रकाशन, मुंबई

Kavya  
W.C. Principal  
Modern College of Computer Science & I.T.  
Aurangabad.

(२१/११/२०२३)

मध्ययुगीन मराठी वाङ्मयाचा इतिहास





डॉ. बाबासाहेब आंबेडकर पराठवाडा विद्यापीठ, औरंगाबाद,  
बी.ए. द्वितीय वर्ष, सत्र - तिसरे

CBCS पध्दतीनुसार जून २०२३ पासून लागू  
मराठी (ऐच्छिक) - अभ्यासप्रक्रिका ६ की  
साहित्य प्रकार : कादंबरी



संकेतांक - CC-2C(6) Marathi

तासिका-५७ तास-४५ श्रेयांक - ०३ गुण-५० (लेखी परीक्षा-४०, प्रामाणिक-१०)

उद्दिष्टे :

- कादंबरीचे स्वरूप व घटक सांगता येतील.
- कादंबरीचे विविध प्रकार उदाहरण देऊन दाखविण्यास यत्न होईल.
- कादंबरीचे आशयसूत्र व भाषा यातील विविध घटकांचा उदाहरण देऊन सांगता येईल.
- कादंबरीच्या कथानकाची उदाहरण-घटकांच्या आधारे काढी होते ते सांगता येईल.
- कादंबरीतील जाणिवेचा समजून सांगता येतील.

अ.क्र.	घटक	अभ्यासप्रक्रिकाचे उद्देश्य	श्रेयांक	तास
१	कादंबरीचे स्वरूप : विशेष	१. अर्थ व व्याख्या २. कादंबरीचे स्वरूप विशेष ३. कादंबरीची संरचना व प्रकार	०.५	०८
२	रणांगण-विश्राम शेटेकर	१. 'रणांगण'चे कथानक २. महायुद्धाची पार्श्वभूमी व 'रणांगण'मधील संवाद, विशेष, संयोजन ३. 'रणांगण'चे साह्य्यकीय धूमक्यावर ४. 'रणांगण'चा भाषिक विचार ५. 'रणांगण' शीर्षकाची अन्वयार्थकता	१	१५
३	नदीह - मनोज खोरगावकर	१. 'नदीह' : शेरगावविहीन स्तोकांच्या उदाहरणांचे दाखवणे २. 'नदीह' मधील मानवतावादी दृष्टिकोन ३. 'नदीह'चे साह्य्यकीय विशेष ४. 'नदीह'चा भाषिक विचार ५. 'नदीह' चा मानवतावादी विचार	१	१५
४	प्रकारण	एखाद्या कादंबरीचे परीक्षण, कादंबरीकाराची मूलमूल्ये, सर्वाधिक प्राप्तीपदांची विषयानुसार विषय देणे अधिदेश आहे.	०.५	०७

संदर्भ ग्रंथ :

- नरहर कुसुंदकर - धार आणि काठ, देशमुख आणि कंपनी पब्लिशर्स प्रा.लि. पुणे-३०.
- उषा हस्तक - कादंबरी आणि मराठी कादंबरी, साहित्यसेवा प्रकाशन, औरंगाबाद
- चंद्रकांत बांदिवडेकर - मराठी कादंबरी चिंतन आणि समीक्षा, मेहता प्रकाशन, पुणे

Kwaghmar  
WC Principal  
Modern College of Computer Science & IT,  
Aurangabad.

(संकेतित जिवे)  
अध्यापक नकाद/साहित्य/०६६



डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद.

बी.ए./बी.एससी., द्वितीय वर्ष, सत्र - चौथे

CBCS पद्धतीनुसार जून २०२३ पासून लागू

अभ्यासपत्रिका ४ थी - भारतीय भाषा : मराठी (भाग-४ था)

संकेतांक - AECC-4 Marathi

तासिका-५७ तास-४५ श्रेयांक - ०३ गुण-५० (लेखी परीक्षा-४०, प्रात्यक्षिक-१०)

उद्दिष्टे :

१. विद्यार्थ्यांच्या ठिकाणी श्रममूल्याची वाढ होईल.
२. सामाजिक संवेदनशीलता वाढीस लागेल.
३. विवेकवादाची व वैज्ञानिक दृष्टिकोनाची कास धरण्यास मदत होईल.
४. लेखनातील विविध प्रवृत्ती व प्रकृती समजण्यास मदत होईल.
५. सृजनशील लेखनाकरिता उद्युक्त करण्यास मदत होईल.

अ.क्र	घटक	अभ्यासक्रमाचा तपशील	श्रेयांक	तास
१	गद्य विभाग	१. श्रमजीविका - विनोबा भावे २. आईचं पत्र - रत्नाकर मतकरी ३. समाजक्रांतीचे उदात्ते कबीर, फुले - जी.ए. उगले ४. शब्द - सुधा खराटे ५. केळेवाडी परिसरातील युगपुरुष - मुरहरी केळे ६. आडोसा - लक्ष्मीकमल गेडाम	३	३५
२	पद्य विभाग	१. घेता - वि.दा. कर्दीकर २. आकाशी झेप घे रे पाखरा - जगदीश खंबुडकर ३. जगत आलो असा - सुरेश भट ४. असे जगावे दुनियेमध्ये - गुरू ठाकूर ५. मी असे कित्येक पाहिलेत अश्वत्थामे - देवकर्ण मदन ६. जमीन - केशव देशमुख ७. वारकरी बाप - विनायक पवार ८. शोधा ज्याचे त्याने - नितीन देशमुख ९. विकृतीची लक्ते - धोंडोपंत मानवतकर १०. शृंगार मराठीचा - संगीता कदम-झिजुरके ११. भांडणाचा प्रश्नच कुठं येतो रे ? - डी.के. शेळ १२. मला तो परत भेटला - सुदेश इंगळे	३	३५
३	उपयोजित मराठी	१. सगणक व मराठी भाषा २. सृजनात्मक लेखन ३. अप्रलेख ४. पत्रलेखन व टिप्पणी	०.५	०८
४	प्रकल्प	संबंधित प्राध्यापकांनी विद्यार्थ्यांकडून विषयानुकूल प्रकल्प पूर्ण करून घ्यावेत.		०३

Principal

Modern College of Computer Science & IT,  
Aurangabad.

(सजेरिव जिग)

अध्यक्ष, मराठी अभ्यास मंडळ





डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, उदीरगाबाव,  
बी.कॉम, बी.एस.इकॉयू., बी.एफ.ए., तिसरी वर्ष, सत्र = २०२१

CBCE प्रकृतीनुसार सत्र २०२१ पासून लागू

अभ्यासपत्रिका ४ थी = भारतीय भाषा : मराठी (भाग-२था)

संकेतांक = AECC-4 Marathi

संकेतांक-२४ सत्र-२५ श्रेयांक = ०३ गुण-१०० (लेखी परीक्षा-२०, प्रायोगिक-२०)



सूची

१. विद्याभ्यासिका त्रिकोणी अभ्यासपत्राची वाळ होईल.
२. सार्वजनिक संवेदनशीलता जाहीस लागेल.
३. विद्येकळादाची व वैयक्तिक दुष्टिकोसाची कास भरण्यास मदत होईल.
४. लेखनपरीक्षा विविध प्रकृती व प्रकृती सभ्यतेच्यास मदत होईल.
५. कुलसचीत लेखनाकरिता उच्चतर करण्यास मदत होईल.

क्र.सं.	प्रकार	अभ्यासपत्राचा तपशील	श्रेयांक	सत्र
१	पुस्तक	१. अर्थजीविका - विनोबा भावे २. आर्हर्ष पत्र - रत्नाकर मताकरी ३. सभाजकांतीचे उद्गाते कबीर, फुले - जी.ए. जगले ४. शब्द - सुधा खराटे ५. केलेवाडी परिसरातील शुभगुरूष - मुहूर्ती केले ६. आडोसा - लक्ष्मीकमल गेजाम	१	२५
२	पुस्तक	१. भेता - वि.दा. फर्दीकर २. आकाशी ह्येप भे रे पाखरा - जगदीश खेबुवकर ३. जगत आलो असा - सुरेश भट ४. असे जगाने दुविधेगम्ये - गुरु ताकूर ५. भी असे कित्येक पाहिलेत अश्वत्थामे - देवकर्ण भटन ६. जर्गीव - केशव देशमुख ७. चारकरी बाप - विनायक पंचार ८. शोधा ज्याचे त्याने - वितीन देशमुख ९. निकृतीची लक्षरे - घोडोपंत भावचतकर १०. सुंगार मराठीचा - संगीता चदम-शिबुसके ११. भाऊणाचा प्रश्नच कुठं येतो रे ? - डी.के. शेख १२. भला तो परत भेटला - सुदेश हंगळे	१	२५
३	उपश्लेषित मराठी	१. संगणक व मराठी भाषा २. अमलेश ५. पारिभाषिक शब्द सूची	५, ५, ५	०८
४	प्रकरण	संबंधित प्राध्यापकांची निवारण्यीकृत निवगानुकूल प्रकल्प पूर्ण करून घ्यावेत.	०, ५	०७

(संकेतानुसार) IC Principal  
Modera College of Computer Science & I.T.  
Aurangabad  
५६५३६, मराठी अभ्यास मंडळ.



डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद.

बी.ए. द्वितीय वर्ष, सत्र - चौथे

CBCS पद्धतीनुसार जून २०२३ पासून लागू

मराठी (ऐच्छिक) - अभ्यासपत्रिका ७ जी

मध्ययुगीन मराठी वाङ्मयाचा इतिहास : १६०० ते १८१८

संकेतांक - CC-2D(7) Marathi

तासिका-५७

तास-४५

श्रेयांक - ०३

गुण-५०

(लेखी परीक्षा-४०, प्रात्यक्षिक-१०)

उद्दिष्टे :

१. मराठी वाङ्मयाचा शिवकाल, पेशवेकाल व त्याकालातील साहित्य समजून घेण्यास मदत करणे.
२. मध्ययुगातील महत्त्वाचे पंत व तंत प्रवाह त्यांच्या प्रकृतीसह लक्षात घेण्यास मदत करणे.
३. शिवकाल व पेशवेकाल सामाजिक व राजकीय परिस्थिती समजून घेण्यास मदत होईल.
४. मध्ययुगातील विविध प्रकारच्या लेखनापाठीमागील प्रेरणा समजून घेण्यास मदत होईल.

अ.क्र	घटक	अभ्यासक्रमाचा तपशील	श्रेयांक	तास
१	समर्थ रामदास व समर्थकालीन कवी	१. समर्थ रामदासांचे वाङ्मय २. वेणाबाई ३. समर्थकालीन इतर संत	०.५	०८
२	पंडिती साहित्य	१. पंडिती साहित्याच्या प्रेरणा २. पंडिती साहित्याची वैशिष्ट्ये ३. संत व पंडिती साहित्य तुलना ४. पंडिती साहित्यातील कलात्मकता व कारागिरी ५. महत्त्वाचे पंडित कवी व त्यांचे साहित्य	१	१५
३	शाहिरी काव्य व बखर वाङ्मय	१. शाहिरी काव्याची वैशिष्ट्ये २. पोवाडा व लावणी ३. महत्त्वपूर्ण शाहिरांच्या रचनांचा परिचय ४. बखर गद्याचे स्वरूप व विशेष ५. बखर गद्याच्या प्रेरणा ६. शिवपूर्वकालीन बखरी ७. शिवकालीन बखरी ८. पेशवेकालीन बखरी	१	१५
४	प्रकल्प	मध्ययुगीन पंडितांची व शाहिरांची चरित्रे संकलित करणे, मध्ययुगीन कलाकृतीचे परीक्षण, दोन संप्रदायातील तुलना, महाविद्यालयातील प्राध्यापकांनी विषयानुरूप अन्य विषय येथे प्रकल्प लेखनासाठी देणे अभिप्रेत.	०.५	०७

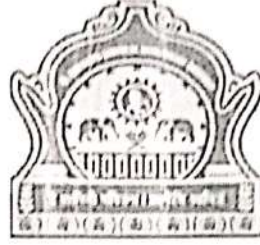
संदर्भ ग्रंथ :

१. टेरे रा. चिं. - प्राचीन मराठीच्या नवधारा - मोघे प्रकाशन, कोल्हापूर
२. देशपांडे अ.ना. - प्राचीन मराठी वाङ्मयाचा इतिहास, व्हीनस प्रकाशन, पुणे
३. नसिराबादकर ल.रा. - प्राचीन मराठी वाङ्मयाचा इतिहास, फडके प्रकाशन, कोल्हापूर
४. भावे वि.ल. - महाराष्ट्र सारस्वत, पॉप्युलर प्रकाशन, मुंबई

Modern College of Computer Science & I.T.,  
Aurangabad.

(सजराग जिजे)  
अध्यक्ष मराठी अभ्यास मंडळ

DR. BABASAHEB AMBEDKAR MARATHIWADA UNIVERSITY,  
AURANGABAD



SYLLABUS OF  
B. A. Honors in Marathi  
Second Year (III, IV Semester)  
(CBCS Semester System)

Under the Faculty of Humanities

FOR  
MODEL COLLEGE, GHANSAWANGI.  
DIST- JALNA.  
(MAHARASHTRA STATE)

(Effective from 2023-24 to onwards)

प्रा. राजेशचंद्र धिंगे  
अध्यक्ष, मराठी अभ्यास मंडळ,  
डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ,  
अहमदाबाद

K. Waghmare  
I/C Principal

Modern College of Computer Science & I.T.,  
Aurangabad.







डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद.

बी.ए. द्वितीय वर्ष, सत्र - चौथे

CBCS पद्धतीनुसार जून २०२३ पासून लागू

मराठी (ऐच्छिक) - अभ्यासपत्रिका ८ वी

साहित्य प्रकार : नाटक

संकेतांक - CC-2D(8) Marathi

तासिका-५७ तास-४५ श्रेयांक - ०३ गुण-५० (लेखी परीक्षा-४०, प्रात्यक्षिक-१०)



उद्दिष्टे :

१. नाटकाचे स्वरूप व घटक सांगता येतील.
२. नाटकाचे विविध प्रकार उलगडून दाखविण्यास मदत होईल.
३. नाटकातील संवादाचे महत्त्व अधारेखित करता येईल.
४. नाटकाची संहिता व प्रयोगमूल्ये यातील सूक्ष्मता उलगडून दाखवता येईल.
५. नाटकातील जाणिवे समजून सांगता येतील.

अ.क्र	घटक	अभ्यासक्रमाचा तपशील	श्रेयांक	तास
१	नाटकाचे स्वरूप : विशेष	१. अर्थ व व्याख्या २. नाटकाचे स्वरूप विशेष ३. नाटकाची परंपरा व प्रकार	०.५	०८
२	कोंतेय - वि.वा शिरवाडकर	१. 'कोंतेय'चे संविधानक २. 'कोंतेय'मधील कुंती व कर्ण यांच्यातील संवाद सूत्र ३. 'कोंतेय'चे वाङ्मयीन मूल्यमापन ४. 'कोंतेय'चा भाषिक विचार ५. 'कोंतेय'ची ऐतिहासिकता व पौराणिकता	१	१५
३	जलमाचा जोळा - प्रतिमा इंगोले	१. 'जलमाचा जोळा'चे संविधानक २. 'जलमाचा जोळा'मधील स्त्रीवाद ३. 'जलमाचा जोळा'चे वाङ्मयीन विशेष ४. 'जलमाचा जोळा'चे भाषिक विचार ५. 'जलमाचा जोळा'मधील पात्रसृष्टी	१	१५
४	प्रकल्प	एखाद्या नाटकाचे परीक्षण, नाटककाराची मुलाखत, संबंधित प्राध्यापकांनी विषयानुरूप विषय देणे अभिप्रेत आहे.	०.५	०७

संदर्भ ग्रंथ :

१. कुलकर्णी अरविंद वामन - मराठी नाट्यलेखन तंत्राची वाटचाल, व्हीनस प्रकाशन, पुणे
२. बनहट्टी श्री.ना - मराठी रंगभूमीचा इतिहास, व्हीनस प्रकाशन, पुणे
३. देशपांडे अ.ना- आधुनिक मराठी वाङ्मयाचा इतिहास, व्हीनस प्रकाशन, पुणे

K. K. Kulkarni

MC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

(सज्जदान जोगे)  
सहायक मराठी अभ्यासक

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad  
Model College, Ghansawangi

B. A. Honors in Marathi  
Second Year III Semester



Course Structure

Paper	Course Code	Paper Name	No. of Credits per Course	No. of Lectures per week	Continue Assessment Marks (CA)	University Assessment Marks (UA)	Total Marks
<b>I. Language Curriculum</b>							
Compulsory Language	L-ENG-301	English-III	04	04	40	60	100
Indian Language (Marathi or Hindi)	IL-MAR-301	भारतीय भाषा - मराठी (भाग-3) (मायबोली)	04	04	40	60	100
	IL-HIN-301	Hindi-III					
<b>II. Major Curriculum</b>							
Major Core	Core A	C-MAR-301	05	05	20	30	50
	Core B	C-MAR-302	05	05	20	30	50
Supportive	S-MAR-301	अनुवादित साहित्य	04	04	40	60	100
Applied	A-MAR-301	उपयोजित लेखन	04	04	40	60	100
<b>III. Life Skill Curriculum</b>							
Job Oriented Curriculum	LSC-301	Job Oriented Curriculum-III	02	02	20	30	50
Value Oriented Curriculum	LSC-302	Value Oriented Curriculum-III	02	02	20	30	50
<b>Total</b>			<b>30</b>	<b>30</b>	<b>240</b>	<b>360</b>	<b>600</b>

प्रा. सर्जेराव जिगे  
अध्यक्ष, मराठी अभ्यास मंडळ,  
डॉ. बाबासाहेब आंबेडकर पराठवाळा विद्यापीठ,  
औरंगाबाद.

K. K. Kulkarni  
I/C Principal  
Modern College of Computer Science & I.T.  
Aurangabad.

Question Paper Structure for University Assessment (U.A.)



**For Major (Core-A and B) Course**

**Maximum Marks: 30** **Time: 1.30 Hours**

Note: 1. All questions are compulsory  
2. Each question carries equal marks.


Q. 1	Long Answer question	OR	10 Marks
	Short answer question		
	a)		05 Marks
	b)		05 Marks
Q. 2	Long Answer question	OR	10 Marks
	Short answer question		
	a)		05 Marks
	b)		05 Marks
Q. 3	Long Answer question	OR	10 Marks
	Short answer question		
	a)		05 Marks
	b)		05 Marks

**For Supportive Course**

**Maximum Marks: 60** **Time: 2.00 Hours**

Note: 1. All questions are compulsory  
2. Each question carries equal marks.

Q. 1	Long Answer question	OR	20 Marks
	Short answer question		
	a)		10 Marks
	b)		10 Marks
Q. 2	Long Answer question	OR	20 Marks
	Short answer question		
	a)		10 Marks
	b)		10 Marks
Q. 3	Long Answer question	OR	20 Marks
	Short answer question		
	a)		10 Marks
	b)		10 Marks

  
 IIC Principal  
 Modern College of Engineering

### Scheme of Evaluation (Marks Distribution)



#### For 20 Marks Continuous Assessment

- |                                 |          |
|---------------------------------|----------|
| 1) Continuous Assessment (C.A.) | 20 Marks |
| Two Class Test Each for         | 05 Marks |
| One Home Assignment for         | 10 Marks |
| 2) University Assessment (U.A.) | 30 Marks |

#### For 40 Marks Continuous Assessment

- |                                 |          |
|---------------------------------|----------|
| 1) Continuous Assessment (C.A.) | 40 Marks |
| Two Class Test Each for         | 10 Marks |
| One Home Assignment for         | 10 Marks |
| One Seminar for                 | 10 Marks |
| 2) University Assessment (U.A.) | 60 Marks |

*Ruaghmare*  
VIC Principal  
Modern College of Computer Science & IT,  
Aurangabad.



डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद.

मॉडेल कॉलेज घनसावंगी, जि. जालना  
बी.ए., बी.कॉम/बी.एस्सी., द्वितीय वर्ष, सत्र-तिसरे

CBCS पद्धतीनुसार जून २०२३ पासून लागू

अभ्यासपत्रिका ३ री - भारतीय भाषा : मराठी (भाग-३ रा)

संकेतांक - MAR-IL301 Marathi

तासिका-६० श्रेयांक - ४ गुण-१०० (लेखी परीक्षा-६०, प्रात्यक्षिक-४०)



उद्दिष्टे :

१. विद्यार्थ्यांच्या मनात निवडक वेच्याच्या परिशीलनाने मूल्यात्मक वाढ होईल.
२. रसास्वाद क्षमता वाढीस लागेल.
३. विद्येकवादाची व वैज्ञानिक दृष्टिकोनाची कास धरण्यास मदत होईल.
४. लेखनातील विविध प्रवृत्ती व प्रकृती समजण्यास मदत होईल.
५. सृजनशील लेखनाकरिता उद्युक्त करण्यास मदत होईल.

अ.क्र	घटक	अभ्यासक्रमाचा तपशील	श्रेयांक	तास
१	गद्य विभाग	१. हसा आणि लड्डू व्हा - निर्मलकुमार फडकुले २. बहुजन समाजाचे शिक्षण - भा.ल. भोळे ३. ऐसे जयाचे पाईक बळिया - किशोर सानप ४. रमाई - यशवंत मनोहर ५. निरोप - राजकुमार तांगडे ६. काकणचोळी - अनिता यलमटे	१	१५
२	पद्य विभाग	१. सागरास - स्वातंत्र्यवीर वि.दा. सावरकर २. कुणाच्या खांद्यावर - आरती प्रभू ३. आवाहन - दत्ता हलसगीकर ४. महापुरूषा ! - हिरा बनसोडे ५. बियाणं - नागनाथ पाटील ६. मराठी माती - वा.ना. आंधळे ७. पिंपळखोपा - निशिकांत आहटे ८. सुगंधी बाग आहे ती - शेख आबिद ९. झोप - उर्मिला चाकूरकर १०. अतिक्रमण - विशाल इंगोले ११. बिरसाईता - सखाराम डाखोरे १२. आळवण - विकास जगताप	१	१५
३	उपयोजित मराठी	१. वृत्तसंकलन व निवेदन २. चॅटजीपीटी ३. सदर लेखन ४. सारांश लेखन	०.५	०८
४	प्रकल्प	संबंधित प्राध्यापकांनी विद्यार्थ्यांकडून विषयानुकूल प्रकल्प पूर्ण करून घ्यावेत.	०.५	०९

*K. V. Kulkarni*  
I/G-Principal  
Modern College of Computer Science & I.T.  
Aurangabad.



डॉ. शबासाहेब आंबेडकर पराजवाडा विद्यापीठ, औरंगाबाद  
मॉडेल कॉलेज घनसावंगी जि. जालना

डॉ. ए. ओमर्से भरारी द्वितीय वर्ष सत्र तिसरे CICS पध्दती नुसार जून 2023 पासून लागू  
संकेतांक - C-MAR-301

कोअर - ए भरारी (मध्ययुगीन काव्य)


तासिकता - 75 श्रेयांक - 25 गुणा-50 (लोखोपरीक्षा-30, प्रात्यक्षिक-20)

संकेत - 19 विद्यार्थी अभ्यास

1. अभ्यास आविष्कार - संपादन, भरारी अभ्यास मंडळ

संदर्भ ग्रंथ :

- 1. अभ्यास आविष्कार - संपादन, भरारी अभ्यास मंडळ (डॉ. शबासाहेब आंबेडकर पराजवाडा विद्यापीठ, औरंगाबाद)
- 2. सत्र नुसार अभ्यास साहित्यिक व सांस्कृतिक जनसंवाद - डॉ. रामचंद्र झाडे
- 3. मंत्र सत्र साहित्य - पी. वि. साहोकर
- 4. मंत्र सत्र साहित्य - अमल शिंदेकर

  
 डॉ. स. ज. पाटील  
 डॉ. शबासाहेब आंबेडकर पराजवाडा विद्यापीठ,  
 औरंगाबाद, महाराष्ट्र

  
 IC Principal  
 Modern College of Computer Science & I.T.  
 Aurangabad



डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद  
मॉडेल कॉलेज घनसावंगी जि. जालना

बी.ए. ऑनर्स मराठी द्वितीय वर्ष सत्र तिसरे CBCS पध्दती नुसार जून 2023 पासून लागू

संकेतांक - C-MAR-302

कोअर-बी मराठी, आधुनिक कविता

तासिका -75 श्रेयांक - 05 गुण-50 (लेखीपरीक्षा-30, प्रात्यक्षिक-20)

घटक - 01

१. भूईभोग - संदीप जगताप.

घटक - 02

१. मला हवी असणारी पहाट - प्रतिभा राजानंद

संदर्भ ग्रंथ :

१. सर्जन प्रेरणा आणि कवित्व शोध - म.सु. पाटील
२. कविता आणि प्रतिमा- सुधीर रसाळ
३. कविता १९६९ ते १९८४- विलास सारंग
४. १९८० नंतरची स्त्रीवादी कविता- सदाशिव सरकटे

प्रा. सर्जेराव जिगे  
अध्यक्ष, मराठी अभ्यास मंडळ,  
डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ,  
औरंगाबाद.  
प्रा. डॉ. सर्जेराव जिगे  
अध्यक्ष, मराठी अभ्यास मंडळ

*Kwaghmare*

H/C Principal  
Modern College of Computer Science & I.T.  
Aurangabad.





I hereby certify that the above  
 mentioned person is  
 duly qualified and eligible for  
 the post of \_\_\_\_\_ in  
 \_\_\_\_\_

This certificate is valid for  
 \_\_\_\_\_ months from the date of issue.  
 \_\_\_\_\_  
 \_\_\_\_\_

- Notes:
- 1. This certificate is valid for \_\_\_\_\_ months.
  - 2. This certificate is valid for \_\_\_\_\_ months.
  - 3. This certificate is valid for \_\_\_\_\_ months.
  - 4. This certificate is valid for \_\_\_\_\_ months.
  - 5. This certificate is valid for \_\_\_\_\_ months.
  - 6. This certificate is valid for \_\_\_\_\_ months.

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



डॉ.बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद  
मॉडेल कॉलेज घनसावंगी जि.जालना  
बी.ए ऑनर्स मराठी द्वितीय वर्ष सत्र तिसरे CBCS पध्दती नुसार जून २०२३ पासून लागू  
संकेतांक - A-MAR-301

अप्लाइड मराठी, उपयोजित लेखन  
तासिका -60 श्रेयांक - ०४ गुण-100 (लेखीपरीक्षा-60, प्रात्यक्षिक-40)



घटक ०१ ओवी, अभंग, भारुड आकलन व आस्वाद

घटक ०२ कीर्तन परंपरा आकलन व आस्वाद

कीर्तन: प्रकार, स्वरूप

घटक ०३ पोवाडा लेखन : आकलन व आस्वाद

पोवाडा : प्रकार, स्वरूप

घटक ०४ लोकगीते व लोककथा गीते : आकलन व आस्वाद

संदर्भ ग्रंथ :

१. कीर्तन परंपरा - डॉ. यशवंत पाठक
२. लोकसंचित - तारा भवाळकर
३. लोकसाहित्याचे स्वरूप - प्रभाकर मांडे
४. भारुड वाडमयातील तत्वज्ञान : डॉ. रामचंद्र देखणे
५. भारुड : राजा मंगळवेढेकर
६. मराठी-हिंदी भारुड काव्य एक अभ्यास : डॉ.सौ.सुमती देशपांडे

प्रा.सर्जराव जिगे  
अध्यक्ष, मराठी अभ्यास मंडळ,  
डॉ.बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ,  
औरंगाबाद,  
प्रा.डॉ. सर्जराव जिगे  
अध्यक्ष, मराठी अभ्यास मंडळ

डॉ.बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद  
मॉडेल कॉलेज घनसावंगी जि.जालना

बी.ए./बी.कॉम/बी.एससी.द्वितीय वर्ष सत्र चौथे CBCS पध्दती नुसार जून 2023 पासून लागू

भारतीय भाषा: मराठी (भाग-4)

संकेतांक -IL-MAR-401

Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY,  
AURANGABAD [M.S.] INDIA.



CIRCULAR/SYLL/CONSTITUTION OF INDIA/ I Yr/2020.

It is hereby inform to all concerned that, the Academic Council at its meeting held on 31st December, 2019 has accepted the Curriculum of "Constitution of India" at First Year College level as per Appendix-'A'.

This is effective from the Academic Year 2020-21 and Onwards.

All concerned are requested to note the contents of this circular and bring notice to the students, teachers and staff for their information and necessary action.

Encl.: - Syllabus.

University campus,


Aurangabad-431 004.

Ref. No. SU/Con./I Yr/Cur./

2020/ 7416 - 25.

Date: 28.01.2020.

}}  
}}  
}}  
}}  
\*\*\*\*\*

  
Deputy Registrar,  
Academic [Syllabus]  
Section.

**Copy forwarded with compliments to:-**

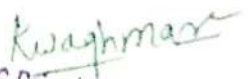
- 1] **The Principals, all affiliated Colleges,**  
Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.
- 2] **The Director, University Network & Information Centre, UNIC, with a request to upload this Circular on University Website.**

**Copy to :-**

- 1] The Director, Board of Examinations & Evaluation,
- 2] **The Section Officer, [B.A. Unit] Examination Branch,**
- 3] The Section Officer, [Eligibility Unit],
- 4] **The Programmer [Computer Unit-1] Examinations,**
- 5] **The Programmer [ Computer Unit-2] Examinations,**
- 6] The In-charge, [E-Suvidha Kendra],
- 7] The Public Relation Officer,
- 8] The Record Keeper,  
Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

-\*\*-

HF\*280120/-

  
I/C Principal  
Modern College of Computer Science & I.T.  
Aurangabad.

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD.

\* COMPULSORY COURSE TO THE UNDER GRADUATE STUDENTS OF AFFILIATED AND CONDUCTED COLLEGES OF UNIVERSITY

[Subject Code: HC 001]

02 Credits

**AN INTRODUCTION TO INDIAN CONSTITUTION**



**Unit I**

1. Meaning and Concept of Indian Constitution
2. Nature of Constitution
3. Brief Idea of Indian Constitution  
[Parts, Articles and Schedule]

**Unit II**

**Silent Features of Indian Constitution**

1. Written and Enacted Constitution; 2. The longest and most detailed Constitution of the World; 3. Rigidity and Flexible Constitution; 4. Parliamentary system of Government; 5. Federal system with unitary bias; 6. Adult Franchise; 7. Single Citizenship; 8. Sovereign, Democratic, Republic; 9. Secularism; 10. Directive Principles of State Policy; 11. Independent Judiciary; 12. Fundamental Rights; 13. Fundamental Duties.

**Unit III**

**A. Fundamental Rights**

1. Concept of State (Art. -12); 2. Right to Equality (Art. -14 to 18); 3. Right to Freedom (Art. -19 to 22); 4. Right against Exploitation (Art. -23 & 24); 5. Right to Religion (Art. -25 to 28); 6. Right of Minorities (Art. -29 & 30); 7. Constitutional Remedies (Art.-32).

**B. Fundamental Duties (Art.-51 A)**

**Unit IV**

**Directive Principles of State Policy (DPSP's)**

1. Meaning and Significance of Directive Principles.
2. Classification/ Principles of D.P.S.P.
3. Relationship between F.Rs. and D.P.S.P.

**Unit V**

**Executives**

**A) Union Government**

The President, Council of Ministers and Prime Minister.

**B) State Government**

The Governor, Council of Ministers and Chief Minister.



### References

1. Constitution of India, Bare Act. Govt. of India.
2. Subhash C Kashyap, Our Constitution (AN Introduction of Indian Constitution and Constitutional Law, National Book Trust, India 2001
3. Avasthi & Maheshwari, Indian Constitution, Lakshmi Narain Agrawal Agra, 2017.
4. Basu D.D., Introduction to the Constitution of India, Lexis Nexis, 2013.
5. Sharma L.N. Indian Prime Minister, the Macmillan Company of India, 1976.
6. Jain H.M. Union Executive, Chaitanya Publishing House, 1969.
7. Dr. S.N. Busi, Dr. B.R. Ambedkar, Framing of Indian Constitution, 1<sup>st</sup> Edition, 2015.
8. M.P. Jain, Indian Constitution Law, 7<sup>th</sup> Edn., Nexis 2014.
9. M.P. Jain, Outlines of Indian Legal and Constitutional History, Lexis Nexis, 2014.
10. भारताचे संविधान.
11. प्रदिप गायकवाड, (संपादक) भारताचे संविधान शिल्पकार डॉ. बाबासाहेब आंबेडकर दिक्षाभूमी संदेश, नागपूर २००६.
12. ग्रॅनव्हिल ऑस्टिन, अनुवाद भारती केळकर भारताची राज्यघटना, राष्ट्राची कोणशिला, डायमंड पब्लिकेशन, पुणे २०१३.
13. डॉ. भा.ल. भोळे, भारताचे शासन आणि राजकारण, विद्या प्रकाशन, नागपूर.

**Note: All latest volumes of above mentioned books must be preferred. The above list of books is not an exhaustive one.**

Internal Test (45 Minutes)  
Home Assignment  
Theory Paper (02 Hours)

10 Marks  
10 Marks  
30 Marks

[1]	Section - [A]	Ten MCQ Carrying One Mark each	10 Marks
[2]	Section - [B]	Two Short Questions Carrying 5 Marks each Out of Five Questions Students have to Attempt any two	10 Marks
[3]	Section - [C]	One Long Question, Out of Three Questions Students have to attempt any one	10 Marks

**Note: - This Course is bilingual (English & Marathi)  
The Examination will also be bilingual.**

*K. S. Ghuman*  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

Dr. Babasaheb Ambedkar Marathwada University  
Aurangabad- 431004(MS) India



Three Year Undergraduate Bachelor Degree Program  
In Science and Technology

B. Sc. (Computer Science)

Curriculum Structure and Scheme of  
Examination

Choice Based Credit System  
(Effective from Academic Year 2022-23)

Dr. Babasaheb Ambedkar Marathwada University  
Aurangabad – 431004 (MS) India

B. Sc. Comp. Sci.

Dean  
Faculty of Science & Technology  
Dr. Babasaheb Ambedkar Marathwada  
University, Aurangabad

Modern College of Computer Science & IT  
Aurangabad



# Pattern of Question Paper (Theory)

B.Sc. (Computer Science) Semester -----

Course Code -----

Paper Number -----

Title of Paper -----

Time : 1.30 Hrs.

Max Marks: 40

*N.B.*

1. Attempt All Questions.
2. All questions carry equal marks.
3. Illustrate your answer with suitable labelled diagram.

Q.1. Multiple choice questions / Fill In the Blanks / Terms / Definition / One Line Answer questions. (10 Marks)

- 1)
- 2)
- 3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)
- 10)

Q.2. Long answer question. (10 Marks)  
 OR  
 Long Answer question

Q.3. Long answer question (10 Marks)  
 OR  
 Short answer questions  
 a)  
 b)

Q.4. Short Notes on any TWO of the following:- (10 Marks)  
 a)  
 b)  
 c)  
 d)

DC Principal  
 Modern College of Computer Science & IT  
 Aurangabad



HC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



B.Sc. (Computer Science)

Semester - I

---

Dr. Pradeep  
Modern College of Computer Science  
Aurangabad.



# Curriculum for semester I



Coursecode:CS-111 T Course Title:Computer Fundamentals

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Prerequisites:

There are no prerequisites required for attending this course.

Learning objects

To impart basic introduction to computer hardware, components, computer number system. How the CPU works, fundamental about algorithms and flowchart as well as different types of software.

Learning outcomes

- Students who complete this course successfully will acquire:
- Knowledge of computer fundamental, CPU and its functionalities.
- Understanding of block diagram of hardware peripherals.
- Understanding the concepts of software and its types.
- Understanding the number of system and its conversion between different numbers of systems.
- Understanding the computer based application such as email and video conferencing.

Course Outline

UNIT - 1

## 1. Fundamentals of Computer System

- Characteristics & features of Computers.
- Components of Computers.
- Organization of Computer.

## 2. Computer Generation & Classification

- Generation of Computers : First to Fifth
- Classification of Computers : Distributed & Parallel computers

UNIT - II.

## 3. Computer Memory

- Memory Cell & Organization
- Types of Memory (Primary And Secondary) : RAM , ROM , PROM , EPROM, advantages and disadvantages of each.
- Secondary Storage Devices ( FD, CD, HD, Pen drive, DVD, Tape Drive, DAT )

B. Sc. Comp. Sci.

*Kaushik*  
HC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



#### 4. I/O Devices

- Input Devices : Touch screen , OMR, OBR , OCR, Light pen, Scanners
- Output Devices: Digitizers, Plotters, LCD, Plasma Display, Printers

#### UNIT - III

##### 5. Processor

- Structure of Instruction , Description of Processor , Processor Features
- RISC & CISC

#### UNIT - IV

##### 6. Internet, World Wide Web:

Introduction to Internet, Internet Access, Internet Basics, Protocols-TCP/IP, HTTP, FTP, Addressing, World Wide Web (WWW), Web Pages & HTML, Web browsers, Searching for information-search engines. Internet chat. Applications of Internet. Advantages and Disadvantages of Internet.

#### UNIT - V Test and Tutorial

##### Text Books:

1. Fundamentals of Information Technology; By Chetan Srivastava, Kalyani Publishers
2. Fundamentals of Computers; By V. Rajaraman, PHI Publication , IVth Edition.
3. Fundamentals of Programming; By Raj K. Jain, S. Chand Publication

##### Reference Books:

1. Computer Fundamental By B. Ram, BPB Publication.



Course code : CS-112 T

Total Credit: 2

Periods: 3 per week (50)

#### UNIT - 1

1. Number

• Nur

• Co

• B

•

•

•

2. B

Course code : CS-112 T      Course Title : Digital Electronics



Total Credit: 2

Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

### UNIT – 1

#### 1. Number Systems and Arithmetic

- Number System : Decimal , Octal , Hexadecimal & Binary Number System
- Conversion within Binary, Octal, Hexadecimal & Decimal Number System.
- Binary Arithmetic : Binary addition, subtraction, multiplication & division
- Binary subtraction using 1' complement, 2's complement method.
- Hexadecimal arithmetic: Addition, subtraction, multiplication & division

#### 2. Boolean Algebra and Logic Gates

- Postulates of Boolean Algebra
- Theorems of Boolean Algebra: Complementation , commutative, AND, OR, Associative, Distributive, Absorption laws , De morgan's theorems
- Reducing Boolean expressions
- Logic Gates : AND, OR, NOT, Ex-OR, Ex-NOR
- NAND as Universal building block
- Logic diagrams of Boolean expressions Boolean expressions for logic diagrams

### Unit – II

#### 3. Minimization Techniques

- Introduction , Minterms and Maxterms
- K-Map, K-map for 2 variables
- K-map for 3 variables
- K-map for 4 variables

#### 4. Combinational and Arithmetic Logic Circuits

- Half Adder & Full Adder
- Binary parallel Adder
- Half Subtractor, Full Subtractor
- Adder/Subtractor in 2's complement system
- BCD to Decimal decoder
- 2 : 4 demultiplexer
- 4 line to 1 line multiplexer

### Unit – III

#### 5. FlipFlops

- Introduction : RS FF
- Clocked RS FF, D FF
- Triggering, preset and clear
- JK FF , T FF , Race around condition
- Master slave FF

*Kwaj Image*

Modern College of Computer science & IT,  
Aurangabad.

## 6. Counters

- Introduction : Asynchronous/ ripple counter
- Modulus Counter , MOD-12 counter
- Synchronous counter : Synchronous serial & synch parallel counter
- BCD counter
- Ring counter

### UNIT - V Test and Tutorial

## 7. Shift Registers

- Introduction, Buffer register
- Serial- in serial -out Serial-in parallel-out
- Parallel-in serial-out, parallel-in parallel-out

### UNIT - V Test and Tutorial

#### Text Book:

1. Digital Electronics and Micro-Computers - R.K. Gaur , Dhanpat Rai Publication

#### Reference Book:

1. Digital Electronics and Logic Design - N.G. Palan, Technova Publication



Course Code : CS-113 T

Course Title : Operating System I



Total Credit: 2      Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

### Prerequisites:

There are no prerequisites for attending this course.

### Learning Objectives

- To introduce students the basic functioning of operating systems as resource manager and its salient features.
- To acquaint students about Process States, CPU Scheduling, Inter Process Communication, Synchronization, Deadlocks.

### Learning Outcomes

Upon successful completion of the course, the students will:

- Gain knowledge of System Software, Program and Process.
- Understand Types of Operating System, Basic functions of O.S. and Evolution of O.S.
- Understand the concept of Process, Process Control Block and Threads.
- Understand the CPU scheduling Non-Pre-emptive and Pre-emptive Scheduling algorithms
- Understand the concept of Synchronization and Deadlock.

### Course Outline

#### Unit I: Introduction to Operating System:

**Introduction to Software:** Definition, Classification of software, Operating system as the main component of system software, Program and Process.

**Operating System Fundamental :** O.S. as a resource manager, Structure of O.S., Types of O.S.- Single user and multiuser O.S., Basic functions of O.S., Characteristics of modern O.S. **Evolution of O.S. :** Early systems, Simple batch systems, Multiprogramming batch systems, Time sharing system, Operating system for Personal Computers, workstations and Hand held devices, Parallel systems, Distributed systems, Real time systems, Advantages and Disadvantages of each system.

#### Unit II: Process Management:

**Concept of Process:** Process States, Process Control Block, Operations on Processes, Threads.

**CPU Scheduling:** Types of schedulers, Criteria for scheduling, Non-Pre-emptive Scheduling Algorithms – First-come First-served Scheduling and Shortest Job First Scheduling, Pre-emptive Scheduling Algorithms- Priority Scheduling, Round Robin.

#### Unit III: Inter Process Communication and Synchronization:

B. Sc. Comp. Sci.

*K. Waghmare*  
H.C. Principal  
Modern College of Computer Science & I.T.,  
Aurangabad,  
Page 12 of 25

Concurrent and dependent process, need for synchronization, introduction of Critical Section and Semaphores, method of inter process communication, process synchronization, synchronization problem.

#### UNIT – IV

**Deadlocks** :Concept of Deadlock, Deadlock Modeling, Methods for Handling Deadlock.  
Memory management.

#### UNIT – V Test and Tutorial

#### Reference Books:

1. "Operating System", By S.R. Sathe & Anil S. Mokhade, MacMillan Publication.
2. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications 2008.
3. A.S. Tanenbaum, Modern Operating System, 3rd Edition, Pearson Education 2007.
4. G. Nutt, Operating System: A Modern Perspective, 2nd Edition Pearson Edition 1997.
5. W. Stallings, Operating Systems, Internals & Design Principles 2008 5th Edition, Prentice Hall of India.
6. M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill 1992.



*K. V. Jadhav*  
H.C. Principal

Course code: CS-114 T

Course Title: Programming in C

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)



## UNIT - I

### 1. Introduction:

- An Overview of C, History of C language, C as a Structured Language. Features of C.

### 2. Basic Elements & Operators

- Character set, C Token, Identifier & Keywords, Variables
- Constant and its types. Integer constant, floating point constant, character constant, string constants.
- Operators: Arithmetic, Relational, Logical, Unary operators: Increment & decrement Assignment and Conditional operator.
- Precedence & Associativity of Operators

### 3. Data Types

- Data Types: *int, char, float, double*. Declaration & Initialization.
- Type modifier: long, short, signed & unsigned

## UNIT - II

### 4. C Program & I/O statements

- Structure of C Program, Compilation & Execution of C program
- I/O: Introduction, Formatted Input/Output function: *scanf & printf*. Escape sequence characters.
- Library functions: General & Maths.

## UNIT - III

### 5. Control and Iterative Statements:

- Simple if, nested if, if-else, else if ladder
- Switch-case statement
- The conditional expression (?: operator)
- while and do-while loop, and for loop
- break & continue statement, goto statement

## UNIT - IV

### 6. Arrays:

- Introduction, Declaration and initialization Accessing array elements, Memory representation of array.
- One dimension and multidimensional arrays, character array, Introduction to string.

## UNIT - V Test and Tutorial

### Text Books::

1. Let us C : Y.P. Kanetkar [bpb publication]
2. Programming in C : E. Balaburuswamy [Tata macgraw hill]

B. Sc. Comp. Sci.

*Kwajimark*  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

3. Programming in C : Goterfried  
 Reference Books:  
 1. Spirit of C : Moolish Kooper.



Course code : CS-115 T Course Title : Mathematical Foundation

Marks: 50 (UA: 40 + IA: 10)

Total Credit: 2

Periods: 3 per week (50 Minutes each)

**Prerequisites:**

Basic understanding of mathematical concepts (School or Junior College).

**Learning Objectives**

To expose the students to the following:

- Propositional function, statements, well-formed formulas.
- Set theory concepts like Finite Set, Subset, Empty Set and operations on set.
- Matrices and its various types.
- Binary relations, posets, Functions, and pigeonhole principle.
- Algebraic structures like groups and elementary combinatorics.
- Various concepts in graphs and trees like its representation and its types.

**Learning Outcomes**

After successful completion of course the student should be able to

- Know how to represent various statements using set, relations, functions, permutations and combinations, groups, graphs and trees
- Use logical notations to formulate and reason about fundamental mathematical concepts such as sets, relations, functions and algebraic structures.
- Analyse the growth of functions and real-world problems using various concepts like recurrence relations, graph implementation etc.
- Apply mathematical logic to solve problems, pigeonhole principle to solve real time problems.
- Model and solve real world problems using graphs and trees.

**Course Outline**

**Unit I: Mathematical Logic:**

Propositional Calculus: Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Normal Forms.

**Set Theory:**

Types of Set: Finite, Infinite, Singleton, Empty, Subset, Proper Subset, Universal Set, Power Set, Venn Diagram, Operations on Set: Union of Sets, Intersection of Sets, Complement of Set, Cartesian Product, Difference and Symmetric Difference of Set.

**Introduction to Matrices:** Types of Matrices, Matrix, Operations, Adjoint and Inverse of a Matrix, Rank of a Matrix and Special Matrices.

**Unit II Combination:**

B. Sc. Comp. Sci.

*Kusayimare*  
 W.C. Principal  
 Modern College of Computer Science & I.T.  
 Aurangabad  
 Page 15 of 25



Review of Permutation and Combination, Mathematical Induction - Pigeon hole principle,  
Principle of Inclusion and Exclusion, generating function, Recurrence relations



**Unit III: Basics of Graph Theory and Tree:**

Introduction to Graph, Application of Graph, Finite and Infinite Graph, Incidence and Degree, Null Graph, Isolated and Pendent Vertex, Isomorphism, Subgraph, Walks, Path and Circuit, Union and Intersection Operation, Graph, Planner Graph, Trees, Pendant Vertices on Tree, Binary Tree, Spanning Tree.

**UNIT - IV**

**Relation:**

Basic definitions of Relation and types of Relations, Graph of Relations, Properties of Binary Relations, Matrix Representation of Relations, Operations on Relations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering Relations.

**UNIT - V Test and Tutorial**

**Text Books:**

1. Elements of Discrete Mathematics-A Computer Oriented Approach C. I. Liu, D.P. Mohapatra, 3rd edition Tata McGraw Hill.
2. Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and P. Manohar, Tata McGraw Hill
3. Foundations of Computer Science, A. Aho and J. Ullman- W. H. Freeman, 1992.
4. Discrete Mathematics-Dr. Bembalkar

**Reference Books:**

1. Discrete Mathematics for Computer Scientists and Mathematicians, J. L. Mott, A. Kandel, T.P. Baker, 2nd Edition, Prentice Hall of India.
2. Discrete Mathematical Structures, Bernard Kolman, Robert C. Busby, Sharon Cutter Ross, Pearson Education/PHI.
3. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H. Rosen, 7th Edition, Tata McGraw Hill.

*Kwaghmare*

HC Principal

Modern College of Computer Science & IT,  
Alangabad

Page 16 of 25

Course code : CS-116 T Course Title : Programming Methodology

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)



#### Prerequisites:

There are no prerequisites for attending this course.

#### Learning Objectives

- Learn to develop simple algorithms and flow charts to solve a problem.
- Develop problem solving skills coupled with top down design principles.
- Learn about the strategies of writing efficient and well-structured computer algorithms/programs.
- Develop the skills for formulating iterative solutions to a problem.

#### Learning Outcomes

- Learn the History and types of Programming.
- Learn various approach of writing program.
- Learn to develop simple algorithms and flow charts to solve a problem.

#### Unit I Introduction to Programming Environment

Introduction to Programming, Definition of program and programmer, features of good programming language, Bugs and Debugging,

#### Programming Techniques

Programming approaches: Types of programming methodologies, Procedural Programming, Functional Programming, Structural Programming, Modular Designing, Logical Programming -Top Down Designing, Bottom Up Designing, Object Oriented Programming

#### Unit II Programming Languages

History of languages, Classification of computer language: Types of Programming Languages- Machine Languages . Assembly Languages, High Level Languages, low level language, Structure Language, Object oriented Language, Modular techniques, Modular Programming – advantages, identifying the modules, step-by-step solution, control structures, decision control structures, selection control structures, loop control structures, 4GL, Assembler, Linker, Loader, Interpreter & Compiler, TASM, Debug

#### Unit III Algorithm

Definition, Characteristics , Advantages and disadvantages, Pseudocode or Structured English, Algorithm, basic features and properties of algorithm.

B. Sc. Comp. Sci.

*V/C Principal*  
Modern College of Computer Science & I.T.  
Aurangabad.



## UNIT - IV

### Flow-Chart

Definition, Principles of flowcharting, Flowcharting symbols, Data flow diagram, pseudocode, converting algorithms to flowcharts, problem solving through algorithm and flowchart. Advantages and disadvantages.

## UNIT - V Test and Tutorial

### Books :

1. Fundamentals of Computer V. Rajaraman
2. Programming Logic and Design, Comprehensive By Joyce Farrell
3. Problem Solving and Program Design in C, J. R. Hanly and E. B. Koffman, Pearson, 2015.

*Kwaghmare*

I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad,  
Page 18 of 25

Course code : CS-131 T      Course Title : English Communication Skill  
(linguistic approach)

Total Credit: 3      Marks: 50 (UA: 40 + IA: 10)

Periods: 5 per week (50 Minutes each)

#### Prerequisites:

There are no prerequisites for attending this course.

#### Learning Objectives

- Learn fundamentals of Parts of Speech.
- Detailed study of Spellings, Silent letters and Articles.
- Learn Auxiliary verbs, Subject and Object and how to make Questions and Question tags.
- Addressing the Greetings and giving directions.
- To enhance the vocabulary-building, word formation, Synonyms & Antonyms, One-word substitutes and Phrasal verbs.
- To improve listening, oral and reading skills

#### Learning Outcomes

Upon successful completion of the course, the students will be able to:

- Understand the different styles of communication.
- Understand the effective speaking skills and develops effective reading comprehensions.
- Understand how to write a good personal profile and improve one's presentation skills.
- Develop good writing skills.

#### Course Outline

##### Unit I: Basics of Communication Skill:

**Communication Skills:** Introduction, Definition, Nature and Scope of Communication, an Importance and Purpose of Communication, 'C's of good communication, Process of Communication. **Barriers to communication:** Physiological Barriers, Physical Barriers, Cultural Barriers, Language Barriers, Gender Barriers, Interpersonal Barriers, Psychological Barriers. **Emotional barriers** **Communication Network in Organization:** Personal Communication, Internal Operational Communication, External Operational Communication, Horizontal (Lateral) Communication, Vertical (Downward) Communication, Vertical (Upward) Communication.

##### English Grammar:

**Parts of Speech:** Nouns, Pronouns, Verbs, Adverbs, Adjectives, Conjunctives, Prepositions, Interjections. Using the **Dictionary:** Primary Auxiliaries, Modal Auxiliaries, Subject and Object (Direct/Indirect), Yes or No Questions, Wh-word Questions, Question Tags. **Grammar:** Type of Verbs, Subject- Verb Agreement, Tense (present and past) and Aspect, several possibilities for denoting future Time, vocabulary building, constructing paragraphs

B. Sc. Comp. Sci.



## Unit II: Elements of Communication & Listening Skills:

**Elements of Communication:** Introduction, Face to Face Communication – Tone of voice, Body Language (Non-Verbal Communication), Verbal Communication, Physical Communication, **Listening Skills-I:** Introduction, Listening to Conversation (Formal and Informal), Active Listening, Benefits of Listening Skill, Barriers to Listening, Listening to Announcements (Railway stations/Bus stations/ Airports/ Sports Announcements/ Commentaries etc.) **Listening Skills-II:** Academic Listening (Listening to Lectures), Listening to Talks and Presentations, Note Taking Tips.

## UNIT – III Oral Communication Skills:

Importance of Spoken English, Status of Spoken English in India, International Phonetic Alphabet (IPA) Symbols, Spelling and Pronunciation, Requesting and responding to requests, Congratulating people on their success, Expressing condolences, Apologizing and forgiving, Giving instructions, Seeking and giving permission, Expressing Opinions (likes and dislikes), Demanding Explanations, Asking for and giving advice and suggestions. **Reading Skills:** Purpose, Process, Methodologies, Skimming and Scanning, Levels of Reading, Reading Comprehension.

## Unit IV: Effective Writing Skills:

Elements of Effective Writing, Sentences, Phrases and Clauses, Types of Sentences, Main Forms of Written Communication, Paragraph Writing (Linkage and Cohesion), Letter Writing (Formal and Informal), Essay Writing, Notices, Summarizing, Precise Writing, Note-Making, Amount of Discussion Required Understanding and Applying Vocabulary: Words Often Confused-Pairs of words, One Word Substitutes, Synonyms and Antonyms, Word Formation: Prefixes, Bases and Suffixes (Derivational & Inflectional).

## UNIT – V Test and Tutorial

### Reference Books:

1. **Basic communication skills for Technology**, Andreja. J. Ruther Ford, 2nd Edition, Pearson Education, 2011
2. **Communication skills**, Sanjay Kumar, Pushpalata, 1st Edition, Oxford Press, 2011
3. **Organizational Behaviour**, Stephen.P. Robbins, 1st Edition, Pearson, 2013
4. **Brilliant- Communication skills**, Gill Hasson, 1st Edition, Pearson Life, 2011
5. **Business Communication**, By Urmila Rai & S.M. Rai. Himalaya Pub
6. **Business Communication** Anjali Ghanekar
7. **Anderson, Kenneth. Joan Maclean and Tony Lynch. Study Speaking: A Course in Spoken English for Academic Purposes.** Cambridge: CUP, 2004.

*A. S. He*  
Co-ordinator (CACS)  
Modern College of Computer Science & I.T.,  
Aurangabad.

*K. K. Kulkarni*  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.  
Page 20 of 25

Dr. Babasaheb Ambedkar Marathwada University  
Aurangabad- 431004 (MS) India



Three Year Undergraduate Bachelor Degree Program  
In Science and Technology

B. Sc. (Computer Science)

Curriculum Structure and Scheme of  
Examination

Choice Based Credit System

(Effective from Academic Year 2022-23)

Dr. Babasaheb Ambedkar Marathwada University  
Aurangabad – 431004 (MS) India

*Bhat*  
19/11/23

*[Signature]*  
19/11/23  
Faculty of Science & Technology  
Dr. Babasaheb Ambedkar Marathwada  
University, Aurangabad

*Kwaghmare*  
VC Principal

B.Sc. Comp. Sci.

Modern C...  
Page 1 of 43  
Aurangabad



B.Sc. (Computer Science)  
Semester - II

Page No. \_\_\_\_\_  
Date \_\_\_\_\_  
B.Sc. Comp. III

*K. Jayaram*

VC Principal  
Western College of Computer Science & IT,  
Kuvempu

Course code: CS-211 T Course Title: Data Structures

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)



### Prerequisites:

Basic understanding of C programs & arrays, hands on experience in decision making and looping constructs of C programming language will be a huge benefit.

### Learning Objectives

- To provide fundamental knowledge of data structures and how they are organized/arranged in computer memory.
- To provide knowledge on how data structures are implemented and processed.
- To familiarize with basic techniques of algorithm analysis.
- To equip with the implementation techniques of complex algorithms of insertion, deletion and modification of data stored in various data structures.
- To provide knowledge of the basic functioning of searching and sorting algorithms.

### Learning Outcomes

Students who complete this course successfully will acquire:

- Ability to understand fundamental data structures like arrays, linked-lists, stack, queues, trees, graphs.
- Ability to understand abstract data types.
- Ability to program data structures and use them in implementations of abstract data types.
- Understanding of basic algorithmic complexity.
- Ability to sensibly select appropriate data structures and algorithms for problems and to justify that choice.
- Ability to understand searching and sorting algorithms, their implementation and suitable applications.

### Course Outline

#### Unit I: Data Structures & Algorithm Analysis:

Data Structures: Introduction to linear and non-linear data structures. Algorithm Analysis, Growth rates, Estimating the growth rate, Big O notation.

#### Unit II: Arrays:

Need for Arrays, Linear Arrays, representation of linear arrays (row-major order, column-major order), Traversing, insertion, modification, deletion in linear array, merging linear arrays. 2-dimensional arrays introduction, representation of 2-dimensional array, sparse matrices.

#### Unit III Searching & Sorting:

Need for Searching and sorting, Linear search, binary search, bubble sort, selection sort, insertion sort.

B. Sc. Comp. Sci.

*Kwaghmare*  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.





**Unit IV: Stack & Queue:**  
Introduction, Operations on stack, stack implementation using arrays., Applications of Stack (Expression representation and evaluation), Expression notations (prefix, infix, postfix), Conversion of expression (prefix to infix, infix to postfix). **Queue:** Introduction, Types of queues (Circular Queue, Dequeue), Queue Implementation using arrays, Operations on Queue (Traversing, Insertion, deletion, and modification), Application of Queue (priority queue).

**Unit V: Test & Tutorials**

**Reference Books:**

1. Data Structures using C, by Seema Threja, 2<sup>nd</sup> Edition, Oxford Press.
2. Lipschutz: Schaum's outline series Data structures Tata McGraw-Hill

**E-Books:**

1. Fundamentals of Data Structures in C, by Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed
2. Design & Analysis of computer Algorithms by Alfred Aho, John Hopcroft and Jeffery Ullman ([Link](#))
3. Introduction to Algorithms by Thomas Corman et.al ([Link](#))



*Kwaghmar*

Course Code: CS-212T

Course Title: 8086 Microprocessor

Total Credit: 2

Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

### Prerequisites:

Course CS-112T Digital Electronics.

### Learning Objectives

- To get knowledge of internal architecture of 8086 microprocessor
- Understand different addressing modes.
- Learn assembly language instructions to construct an ALP.

### Learning Outcomes

Upon successful completion of the course, the students will be able to:

- Functional block diagram of 8086 microprocessor
- Functions of each pin of 8086 microprocessor
- Use of instructions in different addressing modes
- Write an assembly language program.

### UNIT – I

#### Introduction to Microprocessor and Microcomputer:

Microprocessor based personal computersystem.

Block diagram of microprocessor based computer system.

Modern computer memory map, I/O Space.

The Microprocessor, buses.

Computer Data formats, ASCII Unicode, BCD.

### UNIT – II

#### Microprocessor and its architecture:

8086 internal architecture.

Real Mode & Protected Mode Memory Addressing.

Memory Paging.

Pinout and Pin function of 8086 microprocessor.

### UNIT – III

#### Addressing Modes:

Data addressingmodes.

Program memory addressingmodes.

Stack memory addressingmodes.

### UNIT – IV

#### MOV revisited:

Machine language. The op-code, PUSH, POP, stack initialization.

Miscellaneous data transfer instructions: XCHG, LAHF & SAHF.

#### Arithmeticinstructions:

Addition, subtraction and comparison.

Multiplication anddivision.

BCD and ASCIIarithmetic.

B.Sc. Comp. Sci.



*Kwaghmare*

I/C Principal

Modern College of Computer Science & I.T.,

Page 28 of 43  
Aurangabad.



## UNIT – V Test and Tutorial

### Text Books:

2. The Intel Microprocessors: Architecture, programming and interfacing-  
By Barry B. Brey
3. Microprocessors and Interfacing: Douglas Hall.



B. Sc. Comp. Sci.

*Kwayhmar*

i/c Principal  
Modern College of Computer Science & IT  
Aurangabad.



Course Code: CS-213T

Total Credit: 2

Periods: 3 per week (50 Minutes each)

Course Title: Operating System-II

Marks: 50 (UA: 40 + IA: 10)



### Prerequisites:

Student must possess fundamental skills of operating system.

### Learning Objectives

- To introduce students the Memory management, Disk management, Device management, Security Policy Mechanism and Introduction to Android Operating System.

### Learning Outcomes

Upon successful completion of the course, the students will:

- Gain knowledge of Memory Management, Paging and Segmentation.
- Understand concept of File, Operation of file, File allocation methods.
- Understand Disk fundamental, Disk Scheduling, Disk management.
- Understand Dedicated devices, Shared devices, I/O Devices, I/O Hardware, Interrupts
- Understand Security Policy Mechanism- Protection and Authentication.
- Understand the basic introduction to Android Operating System.

### Course Outline

#### Unit I: Memory Management:

Address Binding, Logical Vs. Physical address space, Memory Allocation Strategies- Fixed and Variable Partitions, Paging, Segmentation, Virtual Memory.

#### Unit II: Disk Management:

Concept of File, File Operation, Directory Structure, File Allocation Methods- Contiguous and Non-Contiguous allocation method, **Secondary Storage Structure:** Disk fundamental, Disk Scheduling – FCFS Scheduling, SSTF Scheduling, SCAN Scheduling, Disk management.

#### Unit III: Device Management:

Introduction: Dedicated devices, Shared devices and Virtual devices, Pipes, Buffer, I/O System Components : I/O Devices, I/O Hardware, Interrupts, Application I/O Interface.

#### Unit IV: Security Policy Mechanism:

**Protection:** Need of Protection in O.S., Goals of Protection, Domain of Protection, **Authentication-** Password, Encrypted Password and Encryption, Introduction to Android Operating System:

Introduction to Android Operating System, Android Development Framework, Android Application Architecture.

#### Unit V: Test & Tutorials

#### Reference Books:

R. S. Comp. Sci.

*K. V. Kulkarni*  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad

1. "Operating System", By S.R. Saha & Anil K. Mishra, MacMillan Publication.
2. A. Gilmore, P.H. Gilmore, G. Gupta, Operating Systems Concepts, 8th Edition, John Wiley Publications 2008.
3. A.S. Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson Education 2007.
4. G. Vani, Operating System: A Modern Perspective, 2nd Edition Pearson Edition 1999.
5. W. Stallings, Operating Systems, Internals & Design Principles 2008 5th Edition, Prentice Hall of India.
6. M. Mohan, Operating Systems- Concepts and design, Tata McGraw Hill 1992.

B. Sc. Comp. Sci.

*Krishna*  
Principal  
Modern College of Computer Science & IT  
Kuvempu



Course Code: CS-214T

Total Credit: 2

Periods: 3 per week (50 Minutes each)

Course Title: Advance Programming in C

Marks: 50 (UA: 40 + IA: 10)



### Prerequisites:

Basic concepts of C language, Course CS-104T.

### Learning Objectives

- To develop modular applications in C using functions
- To develop applications in C using pointers and structures
- To do input/output and file handling in C.

### Learning Outcomes

Upon successful completion of the course, the students will be able to:

- Develop and implement modular applications in C using functions
- Develop applications in C using structures and pointers
- Design applications using sequential and random-access file processing
- Identify the difference between call by value and call by reference

### Course Outline

#### Unit I: Functions:

Introduction, Types of functions, defining functions, Arguments, Function prototype, actual parameters and formal parameters, calling function, Returning function results. Parameter Passing Mechanism: Call by Value & Call by Reference, Recursion.

#### Unit II: Structure, Union & Pointers:

**Structure:** Introduction, Declaration and initializing structure, Accessing structure members, Nested structures, Arrays of structure, typedef statement and Enumerated data types.  
**Unions:** Declaration, Difference between structure and union. **Pointers:** Introduction, The Address (&) and Indirection (\*) Operators, Declaration and initialization of pointers. Pointer expression and pointer arithmetic, Pointer to pointer. Dynamic Memory Allocation in C using malloc(), calloc(), free() and realloc()

#### Unit III: Storage classes, Preprocessors & String handling Functions:

**Storage classes,** Scope, visibility and lifetime of variable, block and file scope, auto, extern, static and register storage classes. **String handling functions:** strcpy(), strcmp(), strcat(), strlen(), strdup(), strtoul(), gets(), puts(), **Preprocessor Directives:** File inclusion and conditional compiler directives, Macro substitution, #define, #if, #ifndef, #else, #elif, #endif

#### Unit IV: File Handling:

File handling: Introduction, Opening & closing a file, Input/output operations on files, text and binary files, getc(), putc() function. sprintf() and fscanf() function. fread() and fwrite() function. Writing and reading records from text file and binary file, Appending, modifying and deleting a record from file, Random access functions fseek(), rewind(), flush(), remove(), rename() functions.

#### Unit V: Test & Tutorials

B. Sc. Comp. Sci.

*K. Jagtap*  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.  
Page 32 of 43



**Reference Books:**

1. Let us C: Y. P. Kanetkar [bpb publication]
2. Programming in C: E. Balagurusamy [Tata McGraw hill]
3. Programming in C: Gottfried [Shaums Series]



B. Sc. Comp. Sci.

*Kwaghmare*

IC Principal  
Modern College of Computer Science  
Aurangabad

Course code: CS-215 T

Total Credit: 2

Periods: 3 per week (50 Minutes each)

Course Title: Numerical Methods M-2

Marks: 50 (UA: 40 + IA: 10)



### Prerequisites:

Basic knowledge of Mathematics.

### Learning Objectives

- A student should be able to recall basic facts about mathematics and should be able to display knowledge of conventions such as notations, terminology, state important facts resulting from their studies..
- A student should get adequate exposure to global and local concerns that explore them many aspects of Mathematical Sciences.
- Students get familiar with numerical analysis.

### Learning Outcomes

Upon successful completion of the course, the students will be able to:

- Different number theory algorithms.
- Calculate approximate value for using approximation techniques.
- Solve numerical problems using different numerical methods.
- Write algorithms of different numerical techniques.

### Unit – I

Introduction: Mathematical Modeling, Characteristics, Error in Calculatio, Significant Error, Absolute, Percentage Relative Error, Chopping off and Rounding off Error, Truncation Error, Propagation Error.

#### Divisibility Theory in the Integer:

- Early Number Theory.
- The division Algorithm.
- Greatest Common divisor.
- The Euclidean Algorithm.

### Unit- II

#### Numerical Solutions of Transcendental Equations:

- Introduction and Matrix Notation of set of Equations
- Gauss Elimination Method
- Gauss Seidal Method
- Matrix Inversion Method

### Unit-III

- Introduction and Polynomial Interpolation
- Newton-Gregory Forward Difference Interpolation Formula
- Newton-Gregory Backward Difference Interpolation Formula

B.Sc. Comp. Sci.

*Kwaghmare*  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

Page 34 of 43





#### Unit- IV

- Newton's divided Difference Interpolation
- Lagrange's Interpolation

#### UNIT – V Test and Tutorial

##### Reference Books:

1. "Numerical Computational Methods" - Dr. P.B.Patil, Narosa Publication Hous.
2. Introductory Methods of Numerical Analysis by S. S. Sastry
3. Elementary Number Theory by David M. Burton
4. Numerical methods -S.C.Chapra, R.P.Canale-McGraw Hill
5. Numerical methods-E.Balguruswamy



Course code: C

Total Credit: 2

Periods: 3 p

Prerequisite

Basic knowle

Learning

• Lea

• Un

• L

Learn

Upon s

Course code: CS-216 T

Course Title: Database Management System

Total Credit: 2

Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)



### Prerequisites:

Basic knowledge of set theory and set operations, computer file management.

### Learning Objectives

- Learn what is data, database and DBMS
- Understand the basics of database designing.
- Learn different SQL statements

### Learning Outcomes

Upon successful completion of the course, the students will be able to:

- Design a database.
- Normalize a database.
- Create a database perform various operations on database.

### Unit – I

Introduction to Databases, Types of Data, Record and Files, File based System, What is database system, application and purpose of database system, Three-Level of data abstraction, instance and schema, data independence, database users, structure of a DBMS, Advantages and disadvantages of DBMS.

### Unit- II

Entity, attributes and data association relation between entities, The importance of data models, The evolution of data models, Type of Data Model, Advantages and disadvantages of each model.

### Unit-III

Database Design, Design Phases, Normal Forms 1NF, 2NF, 3NF and BCNF, ER-Model entity set, relationship set, attributes, constraints, ER-Diagram basic structure, mapping cardinality, Roles, weak entity set. Symbols used in ER-notations. ERD Issues, 12 Codd's rules,

### Unit- IV

SQL: SQL Languages DDL, DML, DCL, TCL, DDL Statements to Create and Manage Tables using Create & Alter, Manipulating Data using Insert, Update & Delete Statement., Retrieving Data Using SQL Select, Restricting and Sorting Data, Using SingleRow functions, Conversion Functions and Conditional Expressions, Aggregated Data Using Group Function, Displaying data from Multiple tables, Sub queries, Set Operators

### UNIT – V Test and Tutorial

### References:

1. Database system concepts( 6<sup>th</sup> edition) AviSilverschatz, Henry F. Korth, S.Sudarshan
2. An introduction to database systems by Bipin C. Desai

B. Sc. Comp. Sci.

Page 36 of 48  
Principal  
Modern College of Computer Science & IT,  
Aurangabad.



**Course Code: CS-231** **TCourse Title: English Communication Skill (Soft Skill Development)**

**Total Credit: 3**                      **Marks: 50 (UA: 40 + IA: 10)**

**Periods: 3 per week (50 Minutes each)**

**Prerequisites:**

There are no prerequisites for attending this course.



**Learning Objectives**

- To understand the fundamental soft skills and their practical social and workplace usage.
- It helps participants to communicate effectively and to carry themselves confidently and in harmony with the surroundings.
- To identify and overcome the barriers in interpersonal relationships.
- To employ oral and written communication, teamwork, leadership, problem-solving and decision-making skills, to gain best results.

**Learning Outcomes**

- Upon successful completion of the course, the students will be able to:
- Understand the significance and essence of a wide range of soft skills.
  - Learn how to apply soft skills in a wide range of routine social and professional settings.
  - Learn how to employ soft skills to improve interpersonal relationships.
  - Learn how to employ soft skills to enhance employ ability and ensure workplace and career success.

**Course Outline**

**Unit I:**

**Soft Skills:** An Introduction – Definition and Significance of Soft Skills; Process Importance and Measurement of Soft Skill Development. **Self-Discovery:** Discovering the Self; Setting Goals; Beliefs, Values, Attitude, Virtue. **Positivity and Motivation:** Developing Positive Thinking and Attitude; Driving out Negativity; Meaning and Theories of Motivation; Enhancing Motivation Levels.

**Unit II:**

**Public Speaking:** Skills, Methods, Strategies and Essential tips for effective public speaking. **Group Discussion:** Importance, Planning, Elements, Skills assessed; Effectively disagreeing, Initiating, Summarizing and Attaining the Objective, Do's and Don'ts of Group Discussion. **Non-Verbal Communication:** Importance and Elements; Body Language.

**Unit III:**

**Role Play:** Introduction, Basics of Role Playing; Role Play Script (Teacher-Student Script, Short Drama Script, Any Short Plays and etc.), **Interview Skills:** Interviewer and Interviewee – in-depth perspectives, Before, During and After the Interview, Tips for Success, Do's and Don'ts of Interview, **Presentation Skills:** Types, Content, Audience

*Handwritten signature*

Analysis, Essential Tips – Before, During and After, Overcoming Nervousness, Planning and Structuring your Presentation, Techniques of Delivery.

#### Unit IV:

Etiquette and Manners: Social and Business, Stress Management: Stress, Sources of Stress, Ways to Cope with Stress, Time Management: Concept, Essentials, Tips, Leadership and Assertiveness Skills: A Good Leader, Leaders and Managers: Leadership Theories: Types of Leaders: Leadership Behaviour: Assertiveness Skills, Decision Making and Negotiation: Introduction to Decision Making, Steps for Decision Making, Decision Making Techniques, Negotiation Fundamentals, Negotiation Styles, Major Negotiation Concepts, Emotional Intelligence: Meaning, History, Features, Components, Intrapersonal and Management Excellence: Strategies to enhance Emotional Intelligence.

#### Unit V: Test & Tutorials

##### Reference Books:

1. Soft Skills: an Integrated Approach to Maximise Personality, Gajendra S. Chauhan, Sangeta Sharma, Wiley India
2. Managing Soft Skills for Personality Development – edited by B.N.Ghosh, McGraw Hill India, 2012.
3. English and Soft Skills – S.P.Dhanavel, Orient Blackswan India, 2010.



Course Code: CS-221 P Course Title : Practical based on CS-211 T and CS-212 T

Total Credit: 1.5

Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Sample List of experiments to be carried out based on the course CS-211 T.

Practical No	Details
<b>Implement Arrays</b>	
1	Write a program to store the elements in 1-D array and display the array in reverse
2	Write a program to read the two arrays from the user and merge them and display the elements.
3	Write a program to insert an element in already existing array.
4	Write a program to delete an element from an array. <b>Implement Searching</b>
5	Write a program to implement linear searching technique.
6	Write a program to implement binary searching technique. <b>Implement Sorting</b>
7	Write a program to sort a list using bubble sort technique and display the list before and after sorting.
8	Write a program to sort a list using selection sort technique and display the list before and after sorting.
9	Write a program to sort a list using insertion sort technique and display the list before and after sorting. <b>Implement Stack:</b>
10	Write a program to implement the concept of Stack with Push, Pop, Display and Exit operations.
11	Write a program to convert an infix expression to postfix conversion.
12	Write a program to convert an infix expression to prefix conversion.
13	Write a program to evaluate a postfix expression. <b>Implement Queue:</b>
14	Write a program to implement the concept of Queue with Insert, Delete, Display and Exit operations.
15	Write a program to implement the concept of Circular Queue

Sample List of experiments to be carried out based on the course CS-212 T.

1. Addition and subtraction of two 8-bit numbers with programs based on different Addressing modes of 8086.
2. Addition and subtraction of two 16-bit numbers. (Using 2's complement method, also programs which access numbers from specified memory locations)
3. Multiplication of two 8-bit numbers using the method of successive addition and Shift & add.
4. Division of two 8-bit numbers using the method of successive subtraction and shift

B. Sc. Comp. Sci.



- &abstract.  
5. Block transfer and block exchange of datatypes.



*Kusajmat*

UC Principal

Modern College of Computer Science & IT,  
Aurangabad

Page 40 of 43

B. Sci. Comp. Sci.

Course Code: CS-222 P Course Title : Practical based on CS-213 T and CS-214 T

Total Credit: 1.5

Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Sample List of experiments to be carried out based on the course CS-213 T.

1. Program to implement memory management first-fit,best-fit,worst-fit.
2. Program to implement file allocation technique linked list.
3. Program to implement FIFO page replacement algorithm.
4. Program to implement page replacement LRU algorithm.
5. Program to implement optimal page replacement algorithm.
6. Program to implement SSTF (Shortest Seek Time First) disk scheduling algorithm.
7. Setting user password at operating system level.
8. Installation of any two peripheral devices.
9. Study of Android development Framework.
10. Study of Android Program development Architecture.

Sample List of experiments to be carried out based on the course CS-214 T.

Practical no	Details
1	Implement the following using functions a) Write a program to exchange two numbers b) Write a program to find factorial of a given number
2	Implement the following using structure a) Write a program to create structure student b) Write a program to demonstrate array of structure
3	Implement the following using union a) Write a program to create union employee b) Write a program to find sizeof() structure and sizeof() union
4	Implement the following using pointer a) Write a program to demonstrate double pointer b) Write a program to exchange two numbers
5	Implement the following storage classes a) Write a program to demonstrate auto and static b) Write a program to demonstrate extern and register
6	Implement the following using preprocessor directives a) Write a program to find area of circle b) Write a program to demonstrate #ifdef,#if and #elif
7	Implement the following using string handling functions a) Write a program to calculate length of string and compare two strings b) Write a program for string copy and string concatenation
8	Implement the following using recursion and enum a) Write a program to find factorial of a given number using recursion b) Write a program to demonstrate enum data type
9	Implement the following using file handling





- (i) Write a program for reading/writing user file
  - (ii) Write a program for reading/writing binary file
- Implement the following programs
- (a) Write a program to demonstrate command() and command() functions
  - (b) Write a program to demonstrate handle() function

BC Panchajoti  
Bharati College of Computer Science & IT,  
Kalyan  
Page 40 of 43

Page No. \_\_\_\_\_



Course Code: CS-223 P Course Title : Practical based on CS-215T and CS-216 T

Total Credit: 1.5

Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Sample List of experiments to be carried out based on the course CS-215 T.

1. Program in C for representation of, Bisection Method
2. Program in C for representation of, False Position Method
3. Program in C for representation of, Newton-Raphson Method
4. Program in C for representation of, Gauss Elimination Method
5. Program in C for representation of, Matrix Inverse Method
6. Program in C for representation of, Newton-Gregory Forward Difference Interpolation Formula
7. Program in C for representation of, Newton-Gregory Backward Difference Interpolation Formula
8. Program in C for representation of Newton's divided Difference Interpolation
9. Program in C for representation of Lagrange's Interpolation

Sample List of experiments to be carried out based on the course CS-216 T.

1. Design 10 schemas for any organization like : School, College, Hospital, Travel Agency, Bank, Company, Library, Shop etc
2. Draw the Entity Relationship Diagram for above organization.
3. Normalize the above selected schemas as per 1NF, 2NF, and 3NF
4. Solve at least 10 Relational Algebraic Queries.



*K. Srinivasan*

IIC Principal

Modern College of Computer Science & I.T.  
Page 9 of 10

*[Faint, illegible text]*

*[Faint, illegible text]*





CIRCULAR NO.SU/B.Sc./CBC&GS /69/2023

It is hereby inform to all concerned that, the syllabi prepared by the Board of Studies, Ad-hoc Boards and recommended by the Dean, Faculty of Science & Technology, the Hon'ble Vice-Chancellor has accepted the following syllabi of Bachelor of Science with Practical Pattern of Question Paper under the scheme of Choice Based Credit & Grading System in his emergency powers under section 12(7) of the Maharashtra Public Universities Act, 2016 on behalf of the Academic Council as appended herewith.

Sr.No.	Courses	Semester
1.	B.Sc. Biotechnology (Optional)	IIIrd & IVth semester
2.	B.Sc. Microbiology (Optional)	IIIrd & IVth semester
3.	B.Sc. Information Technology (Optional)	IIIrd & IVth semester
4.	Bachelor of Computer Application (Optional)	IIIrd & IVth semester
5.	B.Sc. Polymer Chemistry (Optional)	IIIrd & IVth semester
6.	B.Sc. Computer Science (Degree)	IIIrd & IVth semester
7.	Honors Degree of Computer Science	IIIrd & IVth semester
8.	Honors Degree of Biotechnology	IIIrd & IVth semester

This is effective from the Academic Year 2023-24 and onwards.  
All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,  
Aurangabad-431 004.  
REF.NO.SU/2023/ 1241-49  
Date:- 12.06.2023.

\*  
\*  
\*  
\*  
\*\*\*\*\*

  
Deputy Registrar,  
Academic Section

Copy forwarded with compliments to :-

- 1] The Principal of all concerned Colleges,  
Dr. Babasaheb Ambedkar Marathwada University,
- 2] The Director, University Network & Information Centre, UNIC, with a request to upload this Circular on University Website.

Copy to :-

- 1] The Director, Board of Examinations & Evaluation, Dr.BAMU,A'bad.
- 2] The Section Officer,[B.Sc.Unit] Examination Branch,Dr.BAMU,A'bad.
- 3] The Programmer [Computer Unit-1] Examinations, Dr.BAMU,A'bad.
- 4] The Programmer [Computer Unit-2] Examinations, Dr.BAMU,A'bad.
- 5] The In-charge,[E-Suvidha Kendra], Rajarshi Shahu Maharaj Pariksha Bhavan, Dr.BAMU,A'bad.
- 6] The Public Relation Officer, Dr.BAMU,A'bad.
- 7] The Record Keeper, Dr.BAMU,A'bad.



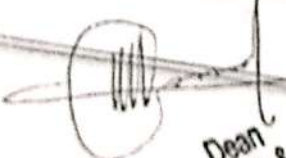
**Three Year Undergraduate Bachelor Degree Program  
In Science and Technology**

**B. Sc. (Computer Science)**

**Curriculum Structure and Scheme of  
Examination**

**Choice Based Credit System**  
(Effective from Academic Year 2022-23)

**Dr. Babasaheb Ambedkar Marathwada University  
Aurangabad – 431004 (MS) India**

  
Dean  
Faculty of Science & Technology  
Dr. Babasaheb Ambedkar Marathwada  
University, Aurangabad

B. Sc. Comp Sci.

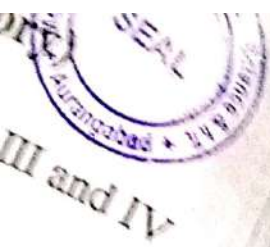


## Important Note Regarding Skill Enhancement Courses

1. Skill Enhancement Courses have a significant theoretical component therefore theory workload is assigned to the course but the teaching of these courses should focus on practical application, with the goal of developing practical skills and knowledge as the final outcome.
2. There shall be no theory examination for Skill Enhancement Courses (SEC-1, SEC-2).
3. The evaluation of Skill Enhancement Courses should be entirely based on college internal assessment, meaning that the assessment will be carried out by the college's respective course incharge, rather than by an external entity.
4. To assess the students' understanding and skills in Skill Enhancement Courses, they should demonstrate their acquired skill through hands-on experience, practical work, projects, and case studies. There should be one assessment for each unit and an additional assessment at the end of the semester.
5. Records of each assessment should be maintained by the college's respective course incharge and should be readily made available upon request.
6. At the end of the semester, the consolidated marks should be submitted to the University for Inclusion in the student's mark sheet, which will contribute towards their final grade.
7. The university should generate the mark list for Skill Enhancement Courses, similar to the internal assessment mark list. The mark list should be downloaded, filled with the consolidated marks of all assessments, and submit along with the internal marks list.

*K. Waghmare*

I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad  
Page 2 of 56



III and IV

Marks: 40



### Pattern of Question Paper(Practical)

B. Sc. (Computer Science) Semester - III and IV

Course Code .....

Paper Number .....

Title Of Paper .....

Time: 3:00 Hrs.

Max Marks : 100 (UA:80+IA:20)

N.B.

1. Attempt All Questions.
2. All questions carry equal marks.
3. Illustrate your answer with suitable labelled diagram

#### Section A

Q:1 Experiment based on CS-313 P (25 Marks)

- a) Question / Experiment- 35 Marks
- b) Viva / Oral - 05 Marks
- c) Internal Evaluation : 07 Marks
- d) Record book : 03 Marks

#### Section B

Q:2 Experiment based on CS-413 P (50 Marks)

- e) Question / Experiment- 35 Marks
- f) Viva / Oral - 05 Marks
- g) Internal Evaluation : 07 Marks
- h) Record book : 03 Marks

*Karaghmare*  
 VC Principal  
 Modern College of Computer Science & I.T.,  
 Aurangabad.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

Choice Based Credit System (CBCS) Curriculum

For  
Faculty of Science and Technology  
Course Structure (Second Year)  
Three Year Under Graduate Degree Program



B. Sc. (Computer Science) Second Year

Course Type	Semester - III		Course Type	Semester - IV	
	Name of Paper	Credit		Name of Paper	Credit
Core Course VII (DSC-I) Core Course (CC) 7 Credits	Object Oriented Programming Using C++	2	Core Course X (DSC-I D) Core Course (CC) 7 Credits	Core Java	2
	Relational Database Management System	2		Computer Graphics	2
	Lab Course	1.5		Lab Course	1.5
Core Course VIII (DSC-II) Core Course (CC) 7 Credits	Linux Operating System	2	Core Course XI (DSC-II D) Core Course (CC) 7 Credits	Basics of Android OS	2
	Advanced Data Structure	2		Computer Networks	2
	Lab Course	1.5		Lab Course	1.5
Core Course IX (DSC-III) Core Course (CC) 7 Credits	Computational Statistics Using R	2	Core Course XII (DSC-III D) Core Course (CC) 7 Credits	Lab Course	1.5
	Web Fundamental	2		Data Analytics	2
	Lab Course	1.5		Open Source Web Application Development	2
Skill Enhancement Course (SEC-1) 01 Course, 2 credit each	SEC-1 (Any one of the skill to be chosen out of two) (A) - Office Automation (B) - Critical Thinking	2	Skill Enhancement Course (SEC-2) 01 Course, 2 credit each	Lab Course	1.5
				Lab Course	1.5
				Lab Course	1.5
Ability Enhancement Compulsory Courses (AECC), 02 Course, 3 credit each	Communication Skill in English-III	3	Communication Skill in English-IV	3	
					Marathi/Hindi/Sanskrit/Urdu/Arabic - (SI-III) A student can opt for one of these languages
Non-Credit Course	-----	-----	Non-Credit Course	Environment Studies	3
Total Credit		29			29

B. Sc. Comp Sci.

*[Signature]*

Modern College of Engineering  
Aurangabad

W.C. Principal  
Aurangabad

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**  
Choice Based Credit System (CBCS) Curriculum

Faculty of Science and Technology  
For  
Course Structure and Scheme of Examination (Second Year)  
B. Sc. (Computer Science) Three Year Under Graduate Degree Program  
**Semester-III**



Course Type	Course Code	Course Title	Total Periods (Teaching Periods/Week)	Credits	Scheme of Examination				
					UA	IA	Max Marks	Min Marks	
Core Course VII (DSC-I C) Core Course (CC)	CS-311T	Object Oriented Programming Using C++	45 (3/per week)	2	40	10	50	20	
	CS-312T	Relational Database Management System	45 (3/per week)	2	40	10	50	20	
	CS-313P	Lab Course (based on CS-311T)	45 (3/per week)	1.5	40	10	50	20	
	CS-314P	Lab Course (based on CS-312T)	45 (3/per week)	1.5	40	10	50	20	
	CS-321T	Linux Operating System	45 (3/per week)	2	40	10	50	20	
	CS-322T	Advanced Data Structure	45 (3/per week)	2	40	10	50	20	
Core Course VIII (DSC-II C) Core Course (CC)	CS-323P	Lab Course (based on CS-321T)	45 (3/per week)	1.5	40	10	50	20	
	CS-324P	Lab Course (CS-322T)	45 (3/per week)	1.5	40	10	50	20	
	CS-331T	Computational Statistics Using R	45 (3/per week)	2	40	10	50	20	
	CS-332T	Web Fundamental	45 (3/per week)	2	40	10	50	20	
Core Course IX (DSC-III C) Core Course (CC)	CS-333P	Lab Course (based on CS-331T)	45 (3/per week)	1.5	40	10	50	20	
	CS-334P	Lab Course (based on CS-332T)	45 (3/per week)	1.5	40	10	50	20	
	CS-341	SEC-I (Any one of the skill to be chosen out of two) (A) - Office Automation (B) - Critical Thinking	45 (3/per week)	2	-	50	50	20	
Skill Enhancement Course (SEC-1)**	CS-351T	Communication Skill in English-III	45 (3/per week)	3	40	10	50	20	
	CS-361T	Marathi/Hindi/Sanskrit/Urdu/Arabic - (SL-III) A student can opt for one of these languages	45 (3/per week)	3	40	10	50	20	
Non Credit Course									
<b>45 Period Per week</b>				<b>29</b>	<b>560</b>	<b>190</b>	<b>750</b>	<b>300</b>	

\*DCS - discipline Specific core courses

Total Credit for Semester III : 29 (Theory : 20 | Laboratory : 9)

\*\*Refer Important note on Page 2 Related to Skill Enhancement Course Assessment

B. Sc. Comp Sci.

Head of Office of Computer Science & I.T.,  
Aurangabad.

T.

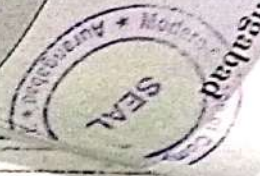


Course Type	Course Code	Course Title	Total Periods (Teaching Periods/ Week)	Credits	Scheme of Examination			Total
					UA	IA	Max Marks	
Core Course X (DSC-I D) Core Course (CC)	CS-411T	Core Java	45 (3/per week)	2	40	10	50	20
	CS-412T	Computer Graphics	45 (3/per week)	2	40	10	50	20
	CS-413P	Lab Course (based on CS-411T)	45 (3/per week)	1.5	40	10	50	20
	CS-414P	Lab Course (based on CS-412T)	45 (3/per week)	1.5	40	10	50	20
Core Course XI (DSC-II D) Core Course (CC)	CS-421T	Basics of Android OS	45 (3/per week)	2	40	10	50	20
	CS-422T	Computer Networks	45 (3/per week)	2	40	10	50	20
	CS-423P	Lab Course (based on CS-421T)	45 (3/per week)	1.5	40	10	50	20
	CS-424P	Lab Course (CS-422T)	45 (3/per week)	1.5	40	10	50	20
Core Course XII (DSC-III D) Core Course (CC)	CS-431T	Data Analytics	45 (3/per week)	2	40	10	50	20
	CS-432T	Open Source Web Application Development	45 (3/per week)	2	40	10	50	20
	CS-433P	Lab Course (based on CS-431T)	45 (3/per week)	1.5	40	10	50	20
	CS-434P	Lab Course (based on CS-432T)	45 (3/per week)	1.5	40	10	50	20
Skill Enhancement Course (SEC-2)**	CS-441	SEC-2 (Any one of the skill to be chosen out of two) (C) - Basic Python Programming (D) - Emotional Intelligence	45 (3/per week)	2	-	50	50	20
	CS-451T	Communication Skill in English-IV	45 (3/per week)	3	40	10	50	20
Ability Enhancement Compulsory Courses (AIECC-4)	CS-461T	Marathi/Hindi/Sanskrit/Urdu/A rabic - (SL-IV) A student can opt for one of these languages	45 (3/per week)	3	40	10	50	20
	CS-471T	Environment Studies	45 (3/per week)	3	40	10	50	20
Non Credit Course		48 <sup>W</sup> Period Per week		29	560	190	750	300
*DCS - discipline Specific core courses								
Total Credit for Semester IV : 29 (Theory : 20 : Laboratory : 9)								

\*\*Refer Important note on Page 2 Related to Skill Enhancement Course Assessment

B. Sc. Comp Sci.

Modern College of Computer Science & IT,  
Aurangabad



Year	Program	SEAL
1A	Max Marks	50
0	50	20
50	20	20
0	20	20
20	20	20



# B. Sc. (Computer Science)

## Semester - III

### Curriculum for semester III

*K. P. Prasad*

H/C P. Principal  
Modern College of Computer Science & I.T.,  
Page 8 of 9 Aurangabad.

B. Sc. Comp Sci.

Course Code: CS311T

Course Title: Object Oriented Programming Using C++

SEAL

Textbook

Object Oriented Programming

Starting Out with

Total Credit: 2

Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

**Prerequisites:**

1. Basic Programming Language Construct (Like looping and decision making) using C
2. Functions and Structures in C

**Learning Objectives**

1. Understand principles of OOP Using C++.
2. Design and implement OOP programs using C++.
3. Understand classes, objects, inheritance, and polymorphism using C++.
4. Develop Object Oriented Programming skills and gain practical experience.

**Learning Outcomes**

After completion of the Course students will be able to

1. Apply OOP principles to design efficient and scalable programs.
2. Use C++ features to create complex and extensible programs.
3. Develop generic and reusable code using Polymorphism.

**Unit -I: Introduction to C++ (10 Periods)**

Input-output in C++, Data Types C++, and drive data types.

The void data type, Type Modifiers, Precedence of Operators, and Strings.

**Unit -II: Structures and Functions in C++ (10 Periods)**

Parts of function, User-defined Functions, Value-Returning Functions, Structure in C++.

Virtual Functions, Structure in C++, Operator and Classes, Advantages of OOP, Class, Build-in Operators on Classes, Assignment Operators, Accessor and Mutator Functions, Constructor, default Constructor, Destructors, Member Functions, Reference parameters and Class Objects (Variables), Member Functions.

**Unit -III: Overloading, Templates and Inheritance (10 Periods)**

Operator Overloading, Function Overloading, Function Templates, Class Templates, Inheritance: virtual Base class, Abstract Class, Pointer and Inheritance, Overloading Member Function, Friend Function.

**Unit-IV: Test and Tutorials (05 Periods)**

In addition to CIA, Tutorial, Seminars, Assignments & case studies are to be given for building proficiency in the course. (Respective course in-charge should maintain the records for the same).

B. Sc. Comp. Sci.

Western  
Western College of Applied Science & Technology  
Aurangabad  
V.C. Principal

20  
V: 91

### Textbook

1. Object Oriented Programming with C++, 3/e by E. Balaguruswamy, Tata McGraw Hill.
2. Starting Out with Object Oriented Programming in C++, by Tony Gaddis, Wiley India.

### References:

1. Mastering C++, 1/e by Venugopal, Tata McGraw Hill.
2. The C++ Programming Language 3/e by Bjarne Stroustrup, Pearson Education.
3. C++, How to Programme, 4e, by Deitel, Pearson Education.
4. Big C++ by Cay Horstmann, Wiley India.

### E-Resources

1. Cplusplus.com: A comprehensive online resource for learning C++ programming, including tutorials, code examples, and a reference guide.  
<https://cplusplus.com/>
2. Codecademy: An online learning platform that offers an interactive C++ course that covers OOP concepts.  
<https://www.codecademy.com/resources/docs/cpp>

Course Code: CS-312T

Course Title:- Relational Database Management System

Total Credit: 2

Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

### Prerequisites:

Database Management System Concepts from Course CS-216T

### Learning Objectives

1. Understand the basic concepts of Relational Database Management System (RDBMS).
2. Learn to design and create a relational database schema using SQL.
3. Explore the functionalities of RDBMS and learn to implement them for data manipulation and retrieval.
4. Understand the concepts of normalization and apply them to eliminate data redundancy and improve data integrity.

### Learning Outcomes

After Completion of the Course students will be able to

1. Design and create a relational database schema using SQL.
2. Implement various RDBMS functionalities such as data insertion, deletion, modification, and retrieval.
3. Demonstrate the ability to use SQL to write complex queries for data analysis and reporting.
4. Understand the principles of database normalization and apply them to ensure data integrity and optimize database performance.

### Unit -1: (10 Periods)

Relational Model: CODD's Rule- Relational Data Model - Key - Integrity - Relational Algebra, Query Languages

B. Sc. Comp Sci.

Year: 1<sup>st</sup> / Sem: 3 / To appear in: 2025

Page No.:



Advances and Innovations - Relational Calculus - Domain Relational Calculus - QRL



Unit-III: (10 Periods)  
 Storage of Relational Database - Introduction to Relational Database Design - Optimization - Transactions and Data Integrity - Functional Dependency - Normalization - NP - 2NF - 3NF - 4NF - BCNF - Transaction Processing - Database Security

Unit-III: (10 Periods)  
 SQL - Commands - Data Query - DML - Subquery, Projection, Join and Set Operations - Aggregate Functions - DDL - Administration - Triggers - Constraints - Subquery

Unit-IV: (10 Periods)  
 PL/SQL - Storage - Programs - Operator Precedence - Control Structure - Iterative Control - Cursors - Procedure - Function - Package - Database Handling - Triggers

Unit-V: Test and Theory (05 Periods)  
 In addition to CIA, Theory, Seminars, Assignments & case studies are to be given for building proficiency in the course. (Respective course in charge should maintain the records for the same).

**Textbook**

1. S. Srinivas, S. Prakasharaj, "Fundamentals of Relational Database Management System", Springer International Edition, 2017.

**References**

1. Abraham Silberstein, Henry F. Korth, S. Sudarshan, "Database System Concepts", MacMillan 2012, 7th Edition.
2. Abhishek Jain & Mahesh Jain, "Fundamentals of DBMS", Vijay Nicole Publications 2014, 2<sup>nd</sup> Edition.

**E-Resources**

1. SQL-Best.com: <http://www.sql-best.com/>. This is a free interactive tutorial that teaches SQL commands using simple exercises and examples.
2. W3Schools SQL: <http://www.w3schools.com/sql/>. This is a comprehensive and free online resource for learning SQL and database management.

Course Code: CS-311P	Course Title: Lab Course (based on CS-311P)
Total Credit: 1.5	Marks: 50 (EA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Sample List of experiments to be carried out based on the course CS-311P

(The teacher can add three practical examples based on each unit as per their choice and feasibility)

B. Sc. Comp Sci

1. Write a C++ program to implement basic data types and operators.
2. Write a C++ program to implement control structures like loops and conditional statements.
3. Write a C++ program to implement a calculator using basic arithmetic operators and control structures.
4. Write a C++ program to implement functions and function overloading.
5. Write a C++ program to demonstrate implementation of structures in C++.
6. Write a C++ program to implement a function that converts a string to uppercase using string functions.
7. Write a C++ program to implement a function that converts a string to uppercase using pointers and arrays.
8. Write a C++ program to implement a class that represents a number with functions for addition, subtraction, multiplication, and division. (Operator overloading)
9. Write a C++ program to implement a class that represents a book with functions for adding, deleting books in a library system. (Introduction to classes and objects)
10. Write a C++ program to implement a class that represents a bank account with functions for deposit, withdraw, and balance check. (Basics of class and object creation)
11. Write a C++ program to implement a class that represents a date with functions for setting and getting the date and calculating the difference between two dates. (Function overloading)
12. Write a C++ program to implement a class hierarchy that includes a base class called "Vehicle" and two derived classes called "Car" and "Motorcycle" with functions for displaying their respective features. (Inheritance and polymorphism)
13. Write a C++ program to implement a class hierarchy that includes a base class called "Shape" and two derived classes called "Circle" and "Rectangle" with functions for calculating their respective areas and perimeters. (Inheritance and polymorphism)
14. Write a C++ program to implement a class that represents a date with functions for setting and getting the date and calculating the difference between two dates. (Function overloading)
15. Write a C++ program to implement the concept of friend function.



Course Code: CS-314P	Course Title: Lab Course (based on CS-312T)
Total Credit: 1.5	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Sample List of experiments to be carried out based on the course CS-312T  
 (The teacher can make use of MySQL or Oracle for laboratory practice and add three practical examples based on each unit as per their choice and feasibility)

1. Create a database and tables using SQL commands
2. Insert data into tables using SQL queries
3. Update existing data in tables using SQL queries
4. Delete data from tables using SQL queries
5. Use SELECT statement to retrieve data from tables
6. Use WHERE clause to filter data in SELECT statements
7. Use GROUP BY and HAVING clauses to aggregate data in SELECT statements
8. Join multiple tables using INNER JOIN and OUTER JOIN
9. Use subqueries to retrieve data from multiple tables
10. Create views to simplify complex SQL queries
11. Create indexes to improve query performance
12. Use data normalization techniques to design and create efficient database schemas
13. Implement foreign keys and referential integrity constraints in database schemas

14. Use transactions to ensure data consistency and atomicity in database operations
15. Backup and restore databases using SQL commands and tools



Course Code: CS-321T      Course Title:- Linux Operating Systems

Total Credit: 2      Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

**Prerequisites:**  
Operating System I & II Courses ( CS-113T & CS-213T)

- Learning Objectives**
1. To learn basics of Linux Operating System, its components, features and flavors
  2. To learn basic and common Linux commands
  3. To learn to set ownership and permissions of the files and directories
  4. To learn to manipulate files/directories.
  5. To learn working in Vi Editor

- Learning Outcomes**  
After Completion of the Course students will be able to
1. Understand the various features and distributions of Linux OS.
  2. Ability to execute basic Linux commands.
  3. Ability to set ownership and permissions for files/directories.
  4. Ability to use the Vi Editor.

**Unit -I: History and Development of Linux (10 Periods)**  
A Brief History of Linux, Basic features of Linux OS, components of Linux System, Benefits of Linux, Acquiring and Using Linux, Examining Linux Distributions, Installation notes, Linux Loader, Linux kernel, Linux file system.

**Unit -II: System Access & User Accounts (10 Periods)**  
System Access and User Accounts -Logging In and out Using the Linux System, Creating Additional User Accounts, Creating & Managing Groups, and Managing Users Linux Commands.

**Unit -III: File System & File Permissions (10 Periods)**  
Introduction to The File System and Working with Linux Permissions , File System Navigation, Managing The File System Understanding Permissions, Changing File And Directory Permissions, Changing Default Permissions And Ownership

**Unit -IV: Using Editors (10 Periods)**  
Using The Vi Editor, Studying Other Editors, Redirection, and Introduction to Programming In C Using Linux (gcc).

**Unit-V: Test and Tutorials (05 Periods)**  
In addition to CIA, Tutorial, Seminars, Assignments & case studies are to be given for building proficiency in the course. (Respective course in-charge should maintain the records for the same).

## Textbook

1. Linux for Beginners: The Ultimate Guide To The Linux Operating System & Linux Commands 1st Edition By Adam Vardy.
2. LINUX: The Ultimate Step by Step Guide to Quickly and Easily Learning Linux by TED DAWSON

## References:

1. McAllister, S, Use Linus-10, Pearson Education, 2006 ISBN-81-7808-488-0 PHI.
2. Ball, Using Linux, PHI, 1998. ISBN-10: 0789716232
3. Das, UNIX: Concepts and Applications (4th Ed), TMH, 2006 ISBN 13: 9780070635463.
4. Foster Johnson, Welch, Anderson, Beginning Shell Scripting, Wiley India (Wrox), 2006 ISBN- 10: 0764583204
5. Neil Mathew, Richard Stones, Beginning Linux Programming (3rd Ed), Wiley India (Wrox), 2006 ISBN: 978-0-470-14762-7
6. Peterson, Linux: Complete Reference (5th Ed), Peterson, TMH. ISBN 10: 0070222940

## E-Resources

1. Linux Journey - <https://linuxjourney.com/> - It is a free interactive online tutorial that covers all the basics of Linux with a series of short lessons.
2. edX Linux Course - <https://www.edx.org/learn/linux> - edX offers a free online course on Linux that covers the fundamentals of Linux, the command-line interface, and basic scripting.
3. Linux Tutorial - [https://www.tutorialspoint.com/unix\\_commands/index.htm](https://www.tutorialspoint.com/unix_commands/index.htm) - This is a comprehensive tutorial that covers all the basic concepts of Linux, including command-line interface, file management, and shell scripting.



Course Code: CS-322T	Course Title:- Advance Data Structure
Total Credit: 2	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	
<b>Prerequisites:</b> Data Structure Courses ( CS-211T)	
<b>Learning Objectives</b> <ol style="list-style-type: none"><li>1. To provide knowledge linked list, its types and its in computer memory.</li><li>2. To familiarize with non-linear data structures.</li><li>3. To provide knowledge on how advance data structures are implemented and processed.</li><li>4. To equip with the implementation techniques of complex algorithms of insertion, deletion and modification of data stored in advance data structures.</li><li>5. To provide knowledge of the functioning of dynamic data structures like heaps binary search trees.</li></ol>	
<b>Learning Outcomes</b> After Completion of the Course students will be able to <ol style="list-style-type: none"><li>1. Understand linked-lists and non-linear data structures like trees and graphs.</li></ol>	

B. Sc. Comp Sci.



2. Program Linked list and non-linear data structure's implementation in memory
3. Select appropriate data structures and algorithms for problems and to justify their choice.
4. Understand advance algorithms like heaps, Kruskal's Algorithm, and Prim's Algorithm.

### Unit -I: Linked List (10 Periods)

Drawbacks of Arrays, Introduction to Linked lists. Types of Linked Lists, Representation of Linked List in Memory, Operations on Singly Linked Lists (Traversing, Insertion, Deletion and modification), Doubly Linked List. Representation of Doubly Linked List in Memory, Operations on doubly Linked Lists (Traversing, Insertion, Deletion and modification).

### Unit -II: Trees (10 Periods)

Introduction and key terminology, Binary Trees Binary Tree Creation and Traversal Using Arrays, Binary Tree Creation and Traversal Using Pointers, Expression Trees, traversing binary tree recursively and iteratively (pre-order, in order, post order traversal). Application of trees (binary search tree).

### Unit -III: Graphs(10 Periods)

Introduction and key terminology, graph representation in memory (static and dynamic), traversing a graph (breadth first search, depth first search), spanning tree. Kruskal's Algorithm, Prim's Algorithm

### Unit -IV: Advance Trees (10 Periods)

Heaps, Min/ Max Heap, Binomial Heap, Fibonacci Heap, Heap Sort, B Tree, B+ Tree.

### Unit-V: Test and Tutorials (05Periods)

In addition to CIA, Tutorial, Seminars, Assignments & case studies are to be given for building proficiency in the course. (Respective course in-charge should maintain the records for the same).

#### Textbook

1. Data Structures using C, by Seema Threja, 2nd Edition, Oxford Press.
2. Lipschutz: Schaum's outline series Data structures Tata McGraw-Hill

#### References:

1. Fundamentals of Data Structures in C, by Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed
2. Design & Analysis of computer Algorithms by Alfred Aho, John Hopcroft and Jeffery Ullman
3. Introduction to Algorithms by Thomas Corman et.al

#### E-Resources

1. Coursera: Data Structures and Algorithms Specialization Link: <https://www.coursera.org/specializations/data-structures-algorithms> This is a series of courses offered by the University of California San Diego on Coursera. It covers topics like algorithmic analysis, graph algorithms, data structures and dynamic programming.
2. Data Structures and Algorithms in C++ by Adam Drozdek Link: <https://www.pdfdrive.com/data-structures-and-algorithms-in-c-e16544168.html> This is a free ebook that covers data structures and algorithms using C++. It includes topics like arrays, linked lists, stacks, queues, trees, sorting and searching algorithms, and graph algorithms.

Course Code: CS-323P

Course Title: Lab Course (based on CS-321T)

B. Sc. Comp Sci.



Total Credit: 1.5      Marks: 50 (UA: 40 + IA: 10)  
 Periods: 3 per week (50 Minutes each)

Sample List of experiments to be carried out based on the course CS-321T

(The teacher can make use of any flavour of Linux distribution and add few more practical based on each unit)

1. Access: Logging In. Linux Commands. Getting Help. Obtaining Information about Your System.
2. Starting and Stopping Linux: Shutting Down a Linux System, Booting a Linux System.
3. Demonstration of Linux commands with attributes: - pwd, cd, ls, more, less, echo, clear, kill, ps, man, cal, date, who, who am I, WC, mkdir, rmdir, rm, sort.
4. File and File Permission: Creation of Files, and changing their permission (Cat,vi, Chmod)
5. Archiving Files: Archiving Files with tar
6. Write a shell script to display first 20 terms of Fibonacci series.
7. Write a shell script to display current time of system and display the message according to the time.
8. Write a shell script to check the user is login or not and say hello.
9. Write a shell script to calculate factorial of a number
10. Using filters & redirections: create new processed files (Using Head, tail, cut, paste etc. create resultsheet/salarysheet)
11. Develop a C Program In Linux to find out 20 terms of Fibonacci series.
12. Develop a C Program In Linux to calculate factorial of a number

Course Code: CS-324P	Course Title: Lab Course (based on CS-322T)
Total Credit: 1.5	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Sample List of experiments to be carried out based on the course CS-322T

(The teacher can make use of any language to implement these programs but are suggested to use either C or C++. Also teacher can add few more practical based on each unit)

Practical No	Details
	<b>Implement Singly Linked List</b>
1	Write a program to create a singly linked, add few nodes, and display the same.
2	Write a program to create a singly linked, add new node at the beginning of the linked list, and display list before and after adding new node.
3	Write a program to create a singly linked, add new node at the end of the linked list, and display list before and after adding new node.
4	Write a program to create a singly linked, delete node at the beginning of the linked list, and display list before and after deletion.
5	Write a program to create a singly linked, delete the last node of the linked list, and display list before and after deletion.

6	Write a program to create a singly linked, add few nodes, modify node at a location, and display the list before and after modification.
	<b>Implement Doubly Linked List</b>
7	Write a program to create a doubly linked, add few nodes, and display the list before and after modification.
8	Write a program to create a doubly linked, add new node at the beginning of the linked list, and display list before and after adding new node.
9	Write a program to create a doubly linked, add new node at the end of the linked list, and display list before and after adding new node.
10	Write a program to create a doubly linked, delete node at the beginning of the linked list, and display list before and after deletion.
11	Write a program to create a doubly linked, delete the last node of the linked list, and display list before and after deletion.
12	Write a program to create a doubly linked, add few nodes, modify node at a specific location, and display the list before and after modification.
	<b>Implement Trees</b>
13	Write a program to create a binary tree of degree 3, display each node.
14	Write a program to create a binary tree of degree 3, and search an element in the tree.
	<b>Implement Graphs:</b>
15	Write a program to implement the concept of breath first search.
16	Write a program to implement the concept of depth first search.
	<b>Implement Advance Trees:</b>
17	Write a program to create a heap tree
18	Write a program to demonstrate the Prim's algorithm

Course Code: CS-331T	Course Title:- Computational Statistics Using R
Total Credit: 2	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	
<b>Prerequisites:</b> Programming language basics.	
<b>Learning Objectives</b>	
<ol style="list-style-type: none"> <li>1. To introduce students to the fundamentals of statistics and their applications in various fields.</li> <li>2. To develop proficiency in using the R programming language for data analysis and visualization.</li> <li>3. To teach students essential statistical techniques, including descriptive statistics, inferential statistics, and regression analysis.</li> <li>4. To enable students to apply statistical methods to real-world datasets and interpret the results.</li> </ol>	
<b>Learning Outcomes</b>	
By the end of the course, students will be able to:	
<ol style="list-style-type: none"> <li>1. Understand the core concepts and methods in statistics, and recognize their importance in various</li> </ol>	
B. Sc. Comp Sci.	



disciplines.

Effectively use the R programming language to manage, analyze, and visualize data.

Apply appropriate statistical techniques, such as hypothesis testing and regression analysis, to answer research questions and make data-driven decisions.

Analyze real-world datasets using statistical methods and R, interpret the results, and communicate their findings to both technical and non-technical audiences.

### Unit -I: Introduction to Statistics and R Language (10 Period)

**Importance of Statistics in Various Fields (01 Period):** Definition and purpose of statistics, Applications of statistics in different fields, such as: Business and economics (e.g., market research, financial analysis), Healthcare (e.g., clinical trials, epidemiology), Social sciences (e.g., psychology, sociology, political science), Natural sciences (e.g., physics, chemistry, biology), Engineering (e.g., quality control, reliability engineering).

**Introduction to R Programming Language and R-Studio (05 Period):** Overview of R and its advantages: Installing R and R-Studio, Navigating the R-Studio interface (console, script editor, environment, plots, and help), R packages and CRAN repository, Basic R Syntax, Data Types, and Operations, R syntax and expressions, Data types: numeric, character, logical, factor, and date/time. Data structures: vector, matrix, list, and data frame, Basic R operations: arithmetic, relational, and logical, Control structures: if-else, for loops, and while loops, Functions: built-in and user-defined.

**Measures of Central Tendency (Mean, Median, Mode) (02 Period):** Definition and properties of mean, median, and mode. Calculation of mean, median, and mode using R functions: mean, median, and mode, **Measures of Dispersion (Range, Variance, Standard Deviation):** Definition and properties of range, variance, and standard deviation, Calculation of range, variance, and standard deviation using R functions: range, var, and sd.

**Introduction to Data Visualization (02 Period):** Importance of data visualization, Types of data visualizations (e.g., bar chart, pie chart, line chart, scatter plot, histogram, box plot). Basic principles of good data visualization.

### Unit -II: Probability and Data Distributions (10 Periods)

1. **Basics of Probability Theory:** Definition of probability and its properties, Sample space, events, and outcomes, Basic rules of probability: addition rule, multiplication rule, and conditional probability, Independent and dependent events, Bayes' theorem

2. **Discrete Probability Distributions:** Introduction to discrete probability distributions, Probability mass function (PMF), Expected value and variance of discrete random variables, Binomial distribution: definition, properties, and applications, R functions: dbinom, pbinom, qbinom, rbinom, Poisson distribution: definition, properties, and applications, R functions: dpois, ppois, qpois, rpois.

3. **Continuous Probability Distributions:** Introduction to continuous probability distributions, Probability density function (PDF) and cumulative distribution function (CDF), Expected value and variance of continuous random variables, Normal distribution: definition, properties, and applications, R functions: dnorm, pnorm, qnorm, rnorm, Exponential distribution: definition, properties, and applications, R functions: dexp, pexp, qexp, rexp

4. **Working with Probability Distributions in R:** Generating random samples from discrete and continuous distributions, Estimating distribution parameters from data, Computing probabilities and percentiles using R functions, Visualizing probability distributions: histograms, density plots, and empirical CDFs, Fitting probability distributions to data using R packages like fitdistrplus

B. Sc. Comp Sci.

*Karshma*  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



### Unit -III: Basic Inferential Statistics: (10 Periods)

- 1. Sampling and Sampling Distributions:** Definition and importance of sampling, Types of sampling methods (e.g., simple random sampling, stratified sampling, cluster sampling), Sampling distribution and its properties, Central Limit Theorem and its implications, Standard error of mean and its calculation using R: sd and length functions.
- 2. Confidence Intervals:** Definition and purpose of confidence intervals, Interpretation of confidence intervals. Calculation of confidence intervals for population mean (using t-distribution), R functions: t.test, qt, and manual calculation, Calculation of confidence intervals for population proportion, R functions: prop.test and manual calculation.
- 3. Hypothesis Testing:** t-test and chi-square test: Definition and purpose of hypothesis testing, Null hypothesis and alternative hypothesis, Type I and Type II errors, significance level, and power, One-sample t-test, two-sample t-test, and paired t-test, R functions: t.test, Chi-square test for goodness-of-fit and independence, R functions: chisq.test
- 4. Introduction to Linear Regression:** Definition and purpose of linear regression, Simple linear regression model: assumptions and parameters, Estimation of parameters using the least-squares method, Interpretation of the regression coefficients and the coefficient of determination (R-squared), R functions for linear regression: lm, summary, confint, predict, and plot

### Unit -IV: Data Analysis and Visualization using R (10 Periods)

- 1. Data Visualization Techniques in R:** **Histograms:** visualizing the distribution of a continuous variable, R functions: hist, **Box plots:** displaying the five-number summary of a continuous variable, R functions: boxplot, **Scatter plots:** visualizing the relationship between two continuous variables, R functions: plot, **Bar charts:** representing the frequency or proportion of categorical variables, R functions: barplot, table
- 2. Analysing Real-World Datasets and Case Studies**
  - Choosing appropriate datasets for practice and analysis (e.g., from sources like Kaggle, UCI Machine Learning Repository, or government websites)
  - Steps for analysing real-world datasets:
    - 1. Data exploration and pre-processing:** handling missing values, outliers, and data transformations
    - 2. Descriptive statistics:** calculating measures of central tendency, dispersion, and visualizing the data
    - 3. Inferential statistics:** applying hypothesis testing and regression analysis to answer research questions
    - 4. Interpretation and communication of results**

Encourage students to work on real-world case studies related to their interests or field of study

### Unit-V: Test and Tutorials (05 Periods)

In addition to CIA, Tutorial, Seminars, Assignments & case studies are to be given for building proficiency in the course. (Respective course in-charge should maintain the records for the same).

### Textbook

1. "Introductory Statistics with R" by Peter Dalgaard (Springer, 2nd Edition, 2008)
2. "Discovering Statistics Using R" by Andy Field, Jeremy Miles, and Zoë Field (SAGE Publications, 2012)

B. Sc. Comp Sci.



### References:

1. "Statistics for Business and Economics" by Paul Newbold, William Carlson, and Betty Thorne.
2. "Probability and Statistics for Engineers and Scientists" by Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, and Keying Ye.
3. "Introduction to Probability and Statistics" by William Mendenhall, Robert J. Beaver, and Barbara M. Beaver.

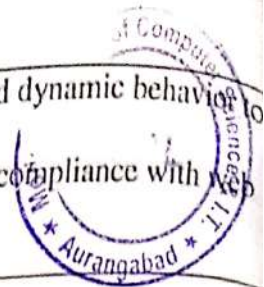
### E-Resources

1. "R Programming for Data Science" by Roger D. Peng
  - Download: <https://bookdown.org/rdpeng/rprogdatascience/>
  - This book focuses on R programming, providing a solid foundation for students interested in learning R for data science and statistical analysis.
2. "An Introduction to Statistical Learning with Applications in R" by Gareth James, Daniela Witten, Trevor Hastie, and Robert Tibshirani
  - Download: <https://www.statlearning.com/>
  - This book covers various statistical learning methods, including linear regression, classification, and clustering, with a focus on applications in R.
3. "The Art of R Programming" by Norman Matloff
  - Download: <https://www.nostarch.com/artofr.htm> (Sample PDF available)
  - This book covers the fundamentals of R programming, data structures, and functions. While not strictly focused on statistics, it provides a strong foundation in R programming for statistical analysis.
4. "R for Data Science" by Hadley Wickham and Garrett Grolemund
  - Download: <https://r4ds.had.co.nz/> (PDF available via the link "Get the book" on the top-right corner)

<b>Course Code: CS-332T</b>	<b>Course Title:- Web Fundamentals</b>
<b>Total Credit: 2</b>	<b>Marks: 50 (UA: 40 + IA: 10)</b>
Periods: 3 per week (50 Minutes each)	
<b>Prerequisites:</b> There are no prerequisites for this course	
<b>Learning Objectives</b>	
<ol style="list-style-type: none"> <li>1. Understand the basic concepts and principles of web technologies, including HTML, CSS, and JavaScript.</li> <li>2. Gain practical skills in creating responsive and accessible web designs.</li> <li>3. Learn how to validate web pages and follow web standards set by the W3C.</li> <li>4. Develop proficiency in manipulating the Document Object Model (DOM) using JavaScript.</li> </ol>	
<b>Learning Outcomes</b>	
After Completion of the Course students will be able to	
<ol style="list-style-type: none"> <li>1. Develop functional and visually appealing web pages using HTML and CSS.</li> <li>2. Design responsive web layouts that adapt to different devices and screen sizes.</li> </ol>	

B. Sc. Comp Sci.

3. Implement client-side scripts using JavaScript to add interactivity and dynamic behavior to pages.
4. Validate and optimize web pages for accessibility, performance, and compliance with web standards.



### Unit -I: Introduction (10 Periods)

1. Web Browsers: Introduction to web browsers, types of web browsers, how they work.
2. Web Servers: Introduction to web servers, types of web servers, how they work.
3. Client-side vs Server-side: Understanding the difference between client-side and server-side processing.
4. Web Standards: Introduction to web standards, W3C, HTML validation, CSS validation.
5. **HTML Syntax and Basic Tags:** study the basic syntax of an HTML document, including doctype declaration, opening and closing tags, and nesting of elements. We will also cover fundamental HTML tags like <head>, <body>, <h1>-<h6>, <p>, <a>, and <img>.
6. **Structure of an HTML Document:** delve into the standard structure of an HTML document including the <!DOCTYPE> declaration, the <html> element, and the <head> and <body> sections. how to use comments and the proper organization of elements within the document.
7. **HTML Elements and Attributes:** learn about the different types of HTML elements, including block-level and inline elements. cover how to use attributes to provide additional information about an element, such as the 'src' attribute for images or the 'href' attribute for links.
8. **Semantic HTML:** explore the importance of using semantic elements in HTML5, such as <article>, <section>, <header>, <nav>, and <footer>, and how these elements can enhance accessibility and search engine optimization of web pages.
9. **HTML5:** study the new features and improvements introduced in HTML5, including multimedia elements like <video> and <audio>, new form input types and attributes, and JavaScript APIs for advanced functionality.
10. **Lists:** learn how to create ordered and unordered lists using the <ol> and <ul> elements.
11. **Links and Navigation:** study how to create different types of links using the <a> element including internal, external, and anchor links, as well as email and telephone links.

### Unit -II: CSS Fundamentals (10 Periods)

1. **Introduction to CSS**  
 Understanding the purpose of CSS  
 Syntax and structure of CSS rules  
 Applying CSS: inline, internal, and external stylesheets  
 Linking a CSS file to an HTML document using the <link> element
2. **Basic Selectors**  
 Element, class, and ID selectors  
 Universal and attribute selectors  
 Grouping and chaining selectors  
 Understanding selector specificity
3. **Advanced Selectors and Combinators**  
 Descendant, child, and sibling combinators  
 Pseudo-classes: :hover, :active, :visited, :first-child, :last-child, and :nth-child  
 Pseudo-elements: ::before, ::after, and ::first-letter  
 Attribute selectors with various matching patterns
4. **Box Model: Basics**  
 Understanding the CSS box model (content, padding, border, margin)  
 Setting width and height of elements  
 Managing overflow and scrollbars
5. **Box Model: Padding, Margin, and Border**  
 Setting padding, margin, and border properties  
 Using shorthand notation for padding, margin, and border



6. **box-sizing** property and its values (**content-box**, **border-box**)  
**Layout and Positioning: Display Property**  
Understanding the **display** property (**block**, **inline**, **inline-block**)  
Using the **display** property to create layouts  
Controlling element visibility with **display: none** and **visibility: hidden**
7. **Layout and Positioning: Floats and Positioning**  
Creating multi-column layouts with **float**  
Clearing floats with the **clear** property  
Static, relative, absolute, and fixed positioning
8. **Layout and Positioning: Flexbox**  
Introduction to the CSS Flexbox layout system  
Defining a flex container and flex items  
Controlling the direction, alignment, and order of flex items  
Handling flexible sizes and growing/shrinking of items
9. **Layout and Positioning: CSS Grid**  
Introduction to the CSS Grid layout system  
Defining a grid container and grid items  
Setting up grid columns, rows, and gaps  
Positioning grid items and controlling their size
10. **Review and Best Practices**  
Review of key concepts covered in the course  
Organizing and structuring CSS code  
CSS naming conventions and methodologies (e.g., BEM)  
Tips for writing maintainable and efficient CSS

### Unit -III: Advanced HTML and CSS Techniques (10 Periods)

1. Advanced HTML: Tables, forms, multimedia, accessibility, SEO.
2. Responsive Web Design: Understanding responsive design principles, media queries, fluid grids, responsive images.
3. CSS3: Advanced CSS3 techniques, transitions, animations, transforms, and gradients.

### Unit -IV: JavaScript Fundamentals (10 Periods)

1. Introduction to JavaScript: Basic concepts, syntax, and usage.
2. Control Structures and Functions: Variables, data types, operators, control structures, functions, and arrays.
3. DOM Manipulation: Accessing and manipulating the Document Object Model (DOM) using JavaScript.
4. Events and Event Handling: Handling user events, event propagation, and delegation.

### Unit-V: Test and Tutorials (05 Periods)

In addition to CIA, Tutorial, Seminars, Assignments & case studies are to be given for building proficiency in the course. (Respective course in-charge should maintain the records for the same).

### Textbook

1. WEB TECHNOLOGIES 2010 by Uttam K.
2. Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics" 5<sup>th</sup> Edition by Jennifer Niederst Robbins
3. "Responsive Web Design with HTML5 and CSS" by Ben Frain

<https://vdoc.pub/download/responsive-web-design-with-html5-and-css3-5vk0jcsnmdy0>

B. Sc. Comp Sci.

I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.





**References:**

1. "HTML and CSS: Design and Build Websites" by Jon Duckett
2. "Web Design with HTML, CSS, JavaScript and jQuery Set" by Jon Duckett
3. "Web Development and Design Foundations with HTML5" by Terry Felke Roberts
4. "Head First HTML and CSS: A Learner's Guide to Creating Standards-Based Web Pages" by Elisabeth Robson and Eric Freeman.

**E-Resources**

1. W3Schools (<https://www.w3schools.com/>) - Provides comprehensive tutorials and references for HTML, CSS, JavaScript, and other web technologies.
2. CSS Tricks: Responsive Design - <https://css-tricks.com/guides/responsive-design/>

Course Code: CS-333P	Course Title: Lab Course (based on CS-331T)
Total Credit: 1.5	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Sample List of experiments to be carried out based on the course CS-331T

1. R Basics  
How do you create and manipulate vectors, matrices, and data frames in R? Demonstrate using arithmetic and logical operators.
2. Importing Data  
How do you import a dataset in CSV format into R? Show how to explore its structure, dimensions, and summary statistics.
3. Data Cleaning  
How do you handle missing data, recode variables, and create new variables based on existing ones in R?
4. Descriptive Statistics  
How do you calculate measures of central tendency and dispersion for a given dataset in R? What can you interpret from the results?
5. Data Visualization: Histograms  
How do you create histograms for continuous variables in a dataset using R? What can you analyze from the shape of the distributions?
6. Data Visualization: Box Plots  
How do you create box plots for continuous variables in a dataset using R? How can you compare distributions and identify outliers?
7. Data Visualization: Scatter Plots  
How do you create scatter plots to visualize the relationship between two continuous variables in R? What can you explore about potential correlations?

B. Sc. Comp Sci.

I/C Principal  
Modern College of Computer Science & I.T.  
Aurangabad.



### Data Visualization: Bar Charts

How do you create bar charts to visualize the frequency or proportion of categorical variables in a dataset using R?

### Probability Distributions

How do you generate random samples from binomial, Poisson, normal, and exponential distributions in R? How can you visualize the results using histograms?

### Confidence Intervals

How do you calculate confidence intervals for population means and proportions using the t-distribution in R? How do you interpret the results?

### Hypothesis Testing: t-test

How do you conduct one-sample, two-sample, and paired t-tests in R? How do you interpret the results and draw conclusions?

### Hypothesis Testing: Chi-square Test

How do you conduct chi-square tests for goodness-of-fit and independence in R? How do you interpret the results and draw conclusions?

### Simple Linear Regression

How do you fit a simple linear regression model to a dataset in R? How do you interpret the coefficients and assess the model's performance using R-squared?

### Model Diagnostics and Assumptions

How do you check the assumptions of a linear regression model (normality of residuals, heteroskedasticity, multicollinearity) in R? What transformations or modifications can you perform if necessary?

### Multiple Linear Regression

How do you fit a multiple linear regression model to a dataset in R? How do you interpret the coefficients and assess the model's performance using R-squared and adjusted R-squared?

Course Code: CS-334P	Course Title: Lab Course (based on CS-332T)
Total Credit: 1.5	Marks: 50 (UA: 40 + LA: 10)
Periods: 3 per week (50 Minutes each)	

Sample List of experiments to be carried out based on the course CS-332T

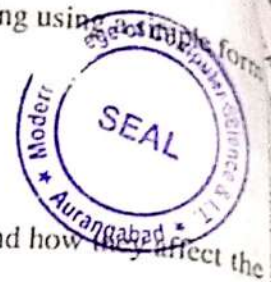
#### Unit I: Introduction

1. Setting up a local web server and creating a simple HTML webpage using a text editor.
2. Examining the HTTP request and response headers in the developer tools of a web browser.
3. Writing and testing a simple client-side JavaScript program using a web browser console.

Dr. P. S. S.

J.C. Principal  
Western College of Computer Science & I.T.,  
Aurangabad.

- Using W3C HTML validator to validate an HTML webpage.
- Examining the difference between client-side and server-side processing using form submission.



**Unit II: CSS Fundamentals**

- Creating a simple webpage with basic CSS styling.
- Experimenting with different CSS selectors and specificity to understand how they affect the styling of a webpage.
- Creating a webpage with different layout and positioning techniques such as floats and flexbox.
- Modifying the box model properties such as padding, margin, and border to achieve desired layouts.
- Using CSS preprocessors like SASS to generate and compile CSS.

**Unit III: Advanced HTML and CSS Techniques**

- Building a responsive website using fluid grids and media queries.
- Creating a form with advanced HTML techniques like validation and accessibility features.
- Implementing animations, transitions, and transformations using CSS3.
- Experimenting with advanced CSS3 properties like gradients and filters.
- Using accessibility tools to test and improve website accessibility.

**Unit IV: JavaScript Fundamentals**

- Building a simple JavaScript application using control structures and functions.
- Using JavaScript to manipulate the Document Object Model (DOM) and dynamically update the webpage.
- Implementing event-handling using JavaScript to create interactivity on a webpage.
- Building a simple calculator application using JavaScript functions and event handling.
- Using JavaScript libraries like jQuery to simplify and enhance DOM manipulation and event handling.

<b>Course Code: CS-341T(A)</b>	<b>Course Title:- Office Automation</b>
<b>Total Credit: 2</b>	<b>Marks: 50 (UA: 40 + IA: 10)</b>
<b>Periods: 3 per week (50 Minutes each)</b>	
<b>Prerequisites:</b> There are no prerequisites for this course	
<b>Learning Objectives</b>	
<ol style="list-style-type: none"> <li>To introduce the students to the concept of office automation and the benefits it provides.</li> <li>To enable the students to use word processing tools for creating, formatting, revising, and sharing documents.</li> <li>To enable the students to use spreadsheet and database management tools for data analysis and visualization.</li> <li>To enable the students to use communication and collaboration tools while ensuring data security and privacy.</li> </ol>	

Form



**Learning Outcomes**

After Completion of the Course students will be able to

1. Define and explain the scope and benefits of office automation.
2. Create and format documents using word processing tools.
3. Manage data using spreadsheet and database management tools.
4. Use communication and collaboration tools securely and maintain data privacy.

**Unit -I: Introduction to Office Automation (10 Periods)**

1. Definition and scope of office automation
2. Benefits of office automation
3. Overview of office automation tools and applications
4. History of office automation
5. Trends in office automation

**Unit -II: Word Processing and Document Management (10 Periods)**

1. Creating and formatting basic documents
2. Advanced formatting techniques (e.g. styles, templates, themes)
3. Working with tables and columns
4. Managing document content and structure
5. Reviewing and revising documents
6. Document sharing and collaboration
7. Automating document creation (e.g. mail merge, macros)

**Unit -III: Spread sheet and Database Management (10 Periods)**

1. Creating and managing basic spreadsheets
2. Advanced formatting techniques (e.g. conditional formatting, data validation)
3. Data analysis and visualization (e.g. charts, pivot tables)
4. Database management and design (e.g. creating tables, relationships, queries)
5. Importing and exporting data
6. Automating tasks (e.g. macros, scripts)

**Unit -IV: Communication and Collaboration Tools; Security and Privacy in Office Automation (10 Periods)**

1. Email and instant messaging basics
2. Advanced email features (e.g. filters, rules, signatures)
3. Online meetings and web conferencing basics
4. Advanced collaboration tools (e.g. shared calendars, task lists, project management)
5. Security threats and risks in office automation
6. Data protection and encryption basics
7. Best practices for secure communication and collaboration

**Unit-V: Test and Tutorials (05 Periods)**

In addition to CIA, Tutorial, Seminars, Assignments & case studies are to be given for building proficiency in the course. (Respective course in-charge should maintain the records for the same).

**Textbook**

1. "Office Automation: Principles and Practice" by Dr. R. K. Singla and Dr. N. P. Singh.
2. "Office Automation and Collaboration" by Prakash Rao

*K. Singh*  
 IIC Principal  
 Modern College of Computer Science & I.T.,  
 Aurangabad.  
 Page 26

## References:

1. "Office 2019 All-in-One For Dummies" by Peter Weverka (Wiley, 2018)
2. "Microsoft Office 2019 Inside Out" by Joe Habraken (Microsoft Press, 2019)
3. "Office 365 & Exchange Online: Essentials for Administration" by William Stueck (CreateSpace Independent Publishing Platform, 2017)
4. "Office 365 for Dummies" by Rosemarie Withee, Ken Withee, and Jennifer Reed (Wiley, 2019)
5. "The Ultimate Guide to Microsoft Office 365" by Sherri McLeish (Independently Published, 2021)

## E-Resources

1. Office Automation - Overview - [https://www.tutorialspoint.com/office\\_automation/office\\_automation\\_overview.htm](https://www.tutorialspoint.com/office_automation/office_automation_overview.htm)
2. History and Development of Office Automation - <https://www.guru99.com/office-automation.html>
3. The Advantages of Office Automation - <https://smallbusiness.chron.com/advantages-office-automation-3077.html>
4. Microsoft Word Basics - <https://edu.gcfglobal.org/en/wordbasics/>
5. Advanced Microsoft Word - <https://edu.gcfglobal.org/en/advanced-word/>
6. Microsoft Excel Basics - <https://edu.gcfglobal.org/en/excelbasics/>
7. Advanced Microsoft Excel - <https://edu.gcfglobal.org/en/advanced-excel/>
8. Database Management Basics - <https://www.guru99.com/database-management-system.html>
9. Google Meet Basics - <https://edu.gcfglobal.org/en/google-meet/>
10. Microsoft Teams Basics - <https://edu.gcfglobal.org/en/microsoft-teams/>
11. Basic Internet Security - <https://www.gcflearnfree.org/internetsafety/basic-internet-security/>

## Here are some practical exercises that align with your syllabus:

### Unit -I: Introduction to Office Automation

1. Research different definitions of office automation and write a brief summary of your findings.
2. Discuss the scope of office automation in your own words and provide examples.
3. Make a list of benefits an office might experience from automation and explain each.
4. Use online resources to create a timeline detailing the history of office automation.
5. Research current trends in office automation and write a short report on three of them.
6. Identify an office process that could benefit from automation and explain how.
7. Create a presentation on a specific office automation tool of your choice.
8. Compare and contrast different office automation tools.
9. Prepare a case study of a company that has successfully implemented office automation.
10. Conduct a mock interview with a manager who has implemented office automation, focusing on the challenges and solutions they encountered.

### Unit -II: Word Processing and Document Management

1. Create a basic document in a word processing application of your choice.
2. Use styles, templates, and themes to format a document.
3. Create a document that includes a table and formatted columns.
4. Use a word processing tool to rearrange and manage the content and structure of a document.
5. Use the review and revision features in your word processing tool to edit a document.
6. Demonstrate how to share a document and collaborate with others using an online platform.
7. Create a mail merge document.
8. Write and run a macro to automate a task in your word processor.
9. Practice saving and exporting a document in different formats.

B. Sc. Comp Sci.

1/C Principal  
Modern College of Computer Science & I.T.  
Aurangabad.



13. Create a template for a recurring document like a meeting agenda or report.



#### Unit -III: Spreadsheet and Database Management

1. Create a basic spreadsheet and input some sample data.
2. Apply conditional formatting and data validation to a spreadsheet.
3. Create a chart and a pivot table to analyze the data in your spreadsheet.
4. Use a database tool to create tables, relationships, and queries.
5. Import data from an external source into your database.
6. Export data from your database to a spreadsheet.
7. Automate a simple task in your spreadsheet or database using macros or scripts.
8. Practice analyzing large sets of data in your spreadsheet.
9. Create a database query that requires multiple conditions.
10. Create a form for data entry in your database.

#### Unit -IV: Communication and Collaboration Tools; Security and Privacy in Office Automation

1. Create an email account and send a message.
2. Set up an email filter, rule, and signature.
3. Participate in an online meeting or web conference.
4. Use a collaboration tool to create shared calendars, task lists, or manage a project.
5. Research common security threats in office automation and summarize your findings.
6. Use a tool to encrypt a message or a file.
7. Create a guide for best practices in secure communication and collaboration.
8. Demonstrate how to securely share a file or document with others.
9. Create a mock phishing email and discuss how to identify and handle such threats.
10. Investigate a recent data breach related to office automation and present a case study.

#### Course Assessment (Full 50 Marks Internal Assessment)

Here are some potential assessments that could be used to evaluate understanding and practical skills for this course:

#### Unit -I: Introduction to Office Automation

1. **Paper/Report:** Submit a report on the history and evolution of office automation.
2. **Presentation:** Give a presentation on current trends in office automation.
3. **Case Study Evaluation:** Evaluate a case study on a company that has successfully implemented office automation.

#### Unit -II: Word Processing and Document Management

1. **Document Creation:** Create a document using advanced formatting techniques such as styles, templates, and themes.
2. **Mail Merge Assignment:** Perform a mail merge operation and submit the resulting documents.
3. **Collaborative Document Editing:** Participate in a collaborative document editing exercise and demonstrate the ability to review and revise the document.

#### Unit -III: Spreadsheet and Database Management

1. **Spreadsheet Assignment:** Create a complex spreadsheet that includes conditional formatting, data validation, charts, and pivot tables.

2. **Database Design:** Design a database with multiple related tables and demonstrate the ability to query the data.
3. **Data Import/Export:** Successfully import and export data between a spreadsheet and a database.



**Unit -IV: Communication and Collaboration Tools; Security and Privacy in Office Automation**

1. **Communication Exercise:** Demonstrate the use of advanced email features and participate in an online meeting or web conference.
2. **Collaboration Project:** Engage in a group project using advanced collaboration tools and submit the final output.
3. **Security and Privacy Assessment:** Create a presentation or report on security threats and best practices for secure communication and collaboration in the context of office automation.
4. **Encryption Exercise:** Demonstrate the ability to encrypt and decrypt a message or file.

Each of these assessments should be graded not only for the final output but also for the process used to create them. The idea is to evaluate the students' understanding and their ability to apply the concepts they've learned in practical situations. It's also crucial to provide clear criteria for each assignment so students know what is expected of them.

Course Code: CS-341T(B)	Course Title:- Critical Thinking
Total Credit: 2	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	
Prerequisites: There are no prerequisites for this course	
Learning Objectives	
<ol style="list-style-type: none"> <li>1. To understand the concept of critical thinking and its significance in personal and professional life</li> <li>2. To develop critical thinking skills like analysis, interpretation, evaluation, inference, and explanation</li> <li>3. To apply critical thinking skills in decision-making and problem-solving</li> <li>4. To exercise and improve the brain's ability to think critically</li> </ol>	
Learning Outcomes	
After Completion of the Course students will be able to	
<ol style="list-style-type: none"> <li>1. Develop critical thinking skills and apply them in various aspects of personal and professional life</li> <li>2. Make informed decisions by analyzing information and evaluating options</li> <li>3. Improve problem-solving skills by breaking down complex problems into smaller components</li> <li>4. Enhance cognitive abilities to think critically and make logical decisions.</li> </ol>	
<b>Unit -I: Introduction to Critical Thinking (10 Periods)</b> Understanding the concept of critical thinking, Historical details of critical thinking, Thinkers who fashioned critical thinking of their time	
<b>Unit -II: Developing Critical Thinking Skills (10 Periods)</b>	

B. Sc. Comp Sci.

Page 1/6  
Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

the process of critical thinking, Inductive and deductive reasoning, Difference between reading and thinking, Reason to Adopt Critical Thinking, How critical thinking solves problems

### Unit-III: Improving Decision Making (10 Periods)

Getting logical thinking, Strategies to improve decision-making skills, Making better decisions

### Unit-IV: Applying Critical Thinking (10 Periods)

Strategies to help improve critical thinking, Group decision-making skills, Applying questions in critical thinking, Exercising the brain

### Unit-V: Test and Tutorials (05 Periods)

In addition to CIA, Tutorial, Seminars, Assignments & case studies are to be given for building proficiency in the course. (Respective course in-charge should maintain the records for the same).



### Textbook

1. "Critical Thinking: Proven Strategies To Improve Decision Making Skills, Increase Intuition And Think Smarter" by Simon Bradley.

### References:

1. "Thinking Critically" by John Chaffee (Oxford University Press India)
2. "Critical Thinking: An Introduction" by Alec Fisher (Cambridge University Press India)
3. "The Miniature Guide to Critical Thinking" by Richard Paul and Linda Elder (Foundation for Critical Thinking India)
4. "Asking the Right Questions: A Guide to Critical Thinking" by M. Neil Browne and Stuart M. Keeley (Pearson India) "Critical Thinking: Tools for Taking Charge of Your Learning and Your Life" by Richard Paul and Linda Elder (Pearson India)

### E-Resources

1. <https://argumentful.com/16-best-free-online-critical-thinking-courses/>

### Course Assessment (Full 50 Marks Internal Assessment)

To assess the skills acquired in a critical thinking course, you can use a combination of formative and summative assessment methods, including written assignments, discussions, group activities, quizzes, tests, and self-assessment. Here are some suggestions:

1. **Written Assignments:** Assign tasks that require students to analyze, evaluate, and synthesize information, such as essays, case studies, and reflections. These assignments can be graded based on predefined rubrics that outline expectations for clarity, depth, and logical reasoning.
2. **Discussions:** Organize in-class or online discussions in which students are required to critically analyze and evaluate different viewpoints, arguments, or evidence. Encourage students to ask probing questions and provide reasoned responses. Assess students' participation and the quality of their contributions.
3. **Group Activities:** Assign group projects or activities that require students to collaborate, analyze problems, and develop solutions using critical thinking skills. Evaluate the projects based on the quality of the work produced, as well as each student's participation and contribution to the group.
4. **Quizzes and Tests:** Create quizzes and tests that evaluate students' understanding of critical thinking concepts and their ability to apply these skills. Assessments can include multiple-choice questions, true/false questions, and short-answer questions. Quizzes can be administered throughout the course to gauge understanding, while tests can be used at the end of the course.





- the end of each unit or at the end of the course to assess overall learning.
5. **Self-assessment:** Encourage students to self-assess their progress and skill development in critical thinking throughout the course. This can be done through reflective journaling, self-assessment checklists, or periodic self-evaluations.
  6. **Peer Assessment:** Have students review and evaluate their peers' work, providing constructive feedback on areas for improvement. This can help students develop their own critical thinking skills and foster a collaborative learning environment.
  7. **In-class Activities:** Conduct hands-on, in-class activities that allow students to practice their critical thinking skills in real-time. Observe how students analyze problems, evaluate evidence, and generate solutions, and provide feedback and support as needed.

By using a combination of these assessment methods, you can effectively evaluate students' skills and knowledge in critical thinking, ensuring that they have developed the necessary competencies for academic and professional success.

Here are sample questions for each of the suggested assessment methods:

1. **Written Assignments:**  
Write an essay analyzing a controversial issue, discussing the main arguments on both sides, and presenting your own reasoned conclusion.
2. **Discussions:**  
In a class discussion, debate the merits of implementing a new policy in a given context (e.g., a workplace, school, or government). Encourage students to ask probing questions and provide well-reasoned arguments.
3. **Group Activities:**  
As a team, analyze a real-life case study involving a complex problem. Develop a solution using critical thinking skills and present your findings to the class.
4. **Quizzes and Tests:**  
Multiple-choice question: Which of the following is an example of inductive reasoning?  
a) All dogs are mammals. Rover is a dog. Therefore, Rover is a mammal.  
b) Every time you eat peanuts, you have an allergic reaction. Therefore, you are allergic to peanuts.  
c) If it rains, the streets will be wet. The streets are wet. Therefore, it rained.  
d) A triangle has three sides. This shape has three sides. Therefore, this shape is a triangle.
5. **True/False question:** Critical thinking requires accepting arguments at face value without questioning the underlying assumptions or evidence.
6. **Self-assessment:**  
Reflect on your growth in critical thinking skills throughout the course. Identify two areas where you have improved, and discuss one area where you still need to improve.
7. **Peer Assessment:**  
Review a classmate's essay on a controversial issue. Provide feedback on the clarity, organization, and depth of their analysis, as well as the strength of their arguments. Suggest at least two specific improvements.
8. **In-class Activities:**  
Participate in a group exercise where students are presented with a hypothetical scenario and must use critical thinking skills to evaluate the situation and make decisions. Observe and provide feedback on students' problem-solving and decision-making processes.

By incorporating these sample questions and activities into your assessments, you can effectively gauge students' understanding and mastery of critical thinking skills.

B. Sc. Comp Sci.

*[Signature]*  
Co-ordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.

*[Signature]*  
Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

Science  
Development  
Taling  
ding  
wn



B. Sc. (Computer Science)  
Semester - IV

Curriculum for semester IV

*K. Srinivas*

HC Principal  
Modern College of Computer Science & IT,  
Page 32 of 56  
Kullangabad.

B. Sc. Comp Sci.  
Kullangabad

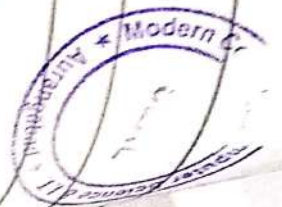
Course Code: CS-411T

Course Title:- Core Java

Total Credit: 2

Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)



**Prerequisites:**

1. Basic Programming Language Construct (Like looping and decision making) using C or C++
2. Functions and Structures in C or C++

**Learning Objectives**

1. To introduce students to the fundamental concepts of Java programming language.
2. To enable students to develop skills in writing and implementing exception handling in Java.
3. To introduce students to the concepts of constructors, wrapper classes, and string operations in Java.
4. To introduce students to the concepts of interfaces and threads in Java programming.

**Learning Outcomes**

After Completion of the Course students will be able to

1. Understand the basic concepts of Java programming language.
2. Write and implement exception handling in Java.
3. Use constructors, wrapper classes, and string operations in Java.
4. Use interfaces and threads in Java programming.

**Unit -I: Introduction to Java (10 Periods)**

Introduction of Java, History of Java, How Java is different from C++, JDK Tools, Class File, Java Bytecode, JVM, identifiers, Data types, Operators, Control Statements, loop, arrays, Inheritance, in Java, Multilevel hierarchy, method overriding, Abstract classes, Final classes

**Unit -II: Package and Exception in Java (10 Periods)**

Defining, Implementing and Applying Packages, Importing Packages, Types of packages, User define package, Exception handling in Java, try, catch, throw, throws and finally, Uncaught Exceptions, Multiple catch, Java's Built-in Exception

**Unit -III: Constructor, Wrapper, String and StringBuffer Class in Java (10 Periods)**

Constructors, Various Types of Constructor, Role of Constructors in inheritance, Introduction to Wrapper Classes, String Operations in java, Immutability, Creating and Initializing Strings using methods of String and StringBuffer Class.

**Unit -IV: Interface and Threads in Java (10 Periods)**

Interface: Defining Interfaces, Abstract Methods in Interfaces, Implementing Interfaces, Extending Interfaces, Interface References, Default Methods in Interfaces, Static Methods in Interfaces, Constants in Interfaces Thread: Thread life cycle, Creating and implementing thread, multi-threaded programming, thread priorities, synchronization of thread, resuming and stopping Threads

**Unit-V: Test and Tutorials (05 Periods)**

In addition to CIA, Tutorial, Seminars, Assignments & case studies are to be given for building proficiency in the course. (Respective course in-charge should maintain the records for the same).

Textbook

1. "Prog
2. "Co

Refer



### Textbook

1. "Programming with Java: A Primer" by E. Haldimann
2. "Your Java Volume 1 - Fundamentals" by Guy S. Hottelmann and Gary Cornell, published by Pearson Education India.

### References

1. "Java: The Complete Reference" by Horstmann, published by McGraw Hill Education India.
2. "Head First Java" by Kathy Sierra and Bert Bates
3. "Effective Java" by Joshua Bloch

### Resources

1. Oracle Java Tutorials: <https://docs.oracle.com/javase/index.html>
2. Java Tutorial for Complete Beginners by John Purcell: <https://www.udemy.com/course/java-basics/>
3. Java Programming Basics by Solut.com: <https://www.solut.com/learning/109/>

<b>Course Code: CS-412P</b>	<b>Course Title: Computer Graphics</b>
<b>Total Credits: 02</b>	<b>Marks: 50 (TA: 40 + IA: 10)</b>
<b>Periods: 3 per week (30 Minutes each)</b>	
<b>Prerequisites:</b> 1. Mathematics 2. Good programming skills in C/C++ 3. Data Structures	
<b>Learning Objectives</b> <ul style="list-style-type: none"><li>• Understanding how the various elements that like algebra, geometry, algorithms and data structures interrelate in the design of graphics.</li><li>• To provides an idea on hardware system architecture for computer graphics.</li><li>• To give idea about basic building blocks of multimedia</li></ul>	
<b>Learning Outcomes</b> After the completion of this course student should apply its real time application knowledge for	
<ul style="list-style-type: none"><li>• Geometrical Transformations in 2-Dimensional and 3-Dimensional perspectives</li><li>• Object representations</li><li>• Surface detection procedures</li><li>• Computer Animations</li></ul>	
<b>Unit-1: Introduction to Computer Graphics:</b> Overview of Computer Graphics, Computer Graphics Application and Software, Description of some graphics devices, Input Devices for Operator Interaction, Active and Passive Graphics Devices, Display Technologies, Storage Tube Graphics Displays, Cathodographic Refresh Graphics Displays, Raster Refresh (Raster-Scan) Graphics Displays, Cathode Ray Tube Basics, Color CRT Raster Scan Basics, Video Basics, The Video Controller, Random-Scan Display Processor, LCD displays.	

*Computer Graphics*

Unit - II: Scan conversion:

Scan conversion: Digital Differential Analyzer (DDA) algorithm, Bresenham's line drawing algorithm, Bresenham's method of Circle drawing, Midpoint Circle Algorithm, Midpoint Ellipse Algorithm, Mid-point criteria, Problems of Aliasing, end-point ordering and clipping lines, Scan Converting Circles

Unit - III: 2-D Geometrical transforms:

Two-Dimensional Transformations: Transformations and Matrices, Transformation Conventions  
2D Transformations, Homogeneous Coordinates and Matrix Representation of 2D Transformations  
Translations and Homogeneous Coordinates, Rotation, Reflection, Scaling, Combined Transformations

Unit - IV: 3-D Three-Dimensional Transformations

Three-Dimensional Transformations: Three-Dimensional Scaling, Three-Dimensional Shearing  
Three- Dimensional Rotation, Three-Dimensional Reflection, Three- Dimensional Translation  
Multiple Transformation,

Introduction to animation: Design of animation sequence, general computer animation functions, faster animation

Unit-V: Test and Tutorials

In addition to CIA, Tutorial, Seminars, Assignment & case studies are to be given for building proficiency in the course. (Respective Course in-charge should maintain the records for the same).

TEXT BOOKS

1. "Computer Graphics C version", Donald Hearn and M. Pauline Baker, Pearson education.
2. "Computer Graphics Second edition", Zhigangxiang, Roy Plastrock, Schaum's outlines, Tata Mc Graw hill edition.

Books Recommended:

1. J.D.Foley, A.Van Dan, Feiner, Hughes Computer Graphics Principles & Practice 2<sup>nd</sup> edition Publication Addison Wesley 1990.
2. D.Hearn, Baker: Computer Graphics, Prentice Hall of India 2008.
3. D.F.Rogers Procedural Elements for Computer Graphics, McGraw Hill 1997.
4. D.F.Rogers, Adams Mathematical Elements for Computer Graphics, McGraw Hill 2<sup>nd</sup> edition 1989.

NPTTEL Video :

1. <https://nptel.ac.in/courses/106106090/#>

Free E-Books

1. <https://www.pdfdrive.com/computer-graphics-books.html>
2. <https://www.pdfdrive.com/introduction-to-computer-graphics-e34322358.html>

B. Sc. Comp Sci.

Principal  
Modern College of Computer Science  
Aurangabad.



Course Code: CS-413P	Course Title: Lab Course (based on CS-411T)
Total Credit: 1.5	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Sample List of experiments to be carried out based on the course CS-411 (The teacher can add three practical examples based on each unit as per the choice and feasibility, the below provided list is a sample list of experiments)

1. Creating a simple Java program to print "Hello World"
2. Implementing basic control statements such as if, else, switch, and loops
3. Creating and using arrays in Java
4. Implementing inheritance in Java with multilevel hierarchy
5. Overriding methods in Java and using final and abstract classes
6. Implementing user-defined packages and importing them
7. Implementing exception handling in Java with try, catch, throw, and finally blocks
8. Creating and using wrapper classes in Java
9. String operations in Java such as concatenation, substring, and length
10. Creating and using interfaces in Java
11. Implementing multi-threaded programming in Java
12. Implementing thread synchronization in Java
13. Creating and using constructor methods in Java
14. Using String and StringBuffer classes in Java
15. Creating a Java program that combines multiple concepts such as inheritance, interfaces, and exception handling.

Course Code: CS-414P	Course Title: Lab Course (Lab based on CS-412T)
Total Credit: 1.5	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Sample List of experiments to be carried out based on the course CS-412T (Computer Graphics)

**This practical can be implemented in C or C++ programming language.**

1. Study and enlist the basic functions used for graphics in C / C++ language. Give an example for each of them.
2. Draw a co-ordinate axis at the center of the screen.
3. Divide your screen into four region, draw circle, rectangle, ellipse and half ellipse in each region with appropriate message.
4. Draw a simple hut on the screen.
5. Draw the following basic shapes in the center of the screen:
  - i. Circle
  - ii. Rectangle

*Kaashmir*

- iii. Square
- iv. Concentric Circles
- v. Ellipse
- vi. Line
- 6. Develop the program for DDA Line drawing algorithm
- 7. Develop the program for Bresenham's Line drawing algorithm.
- 8. Develop the program for the mid-point circle drawing algorithm.
- 9. Develop the program for the mid-point ellipse drawing algorithm.
- 10. Write a program to implement 2D scaling
- 11. Write a program to perform 2D translation
- 12. Perform 2D Rotation on a given object
- 13. Program to create a house like figure and perform the following operations.
  - i. Scaling about the origin followed by translation.
  - ii. Scaling with reference to an arbitrary point.
  - iii. Reflect about the line  $y = mx + c$ .
- 14. Develop a simple text screen saver using graphics functions
- 15. Perform smiling face animation using graphic functions.



<b>Course Code: CS-421T</b>	
<b>Total Credit:02</b>	<b>Course Title: Basics of Android OS</b>
<b>Periods: 3 per week (50 Minutes each)</b>	<b>Marks: 50 (UA: 40 + IA: 10)</b>
<b>Prerequisites: 1. Basic Knowledge of Programming, Concepts of OOPS</b>	
<b>Learning Objectives</b>	
<ol style="list-style-type: none"> <li>1. Describe Platforms on which Android operating system will run. Install Android studio</li> <li>2. Understand the fundamentals of Android Architecture</li> <li>3. Create simple application which runs under Android Operating system</li> <li>4. Understand the UI components</li> <li>5. Explain event handling and create style sheets</li> </ol>	
<b>Learning Outcomes</b>	
On successful completion of the course, students will be able to do following:	
1. Student should perfect in the android operating system and its real time application development.	
<b>Unit-I:</b>	
<b>Environment Setup:</b> Setup Java Development Kit (JDK), Android SDK, Android Development Tools (ADT) Plugin, Create Android Virtual Device,	
<b>Architecture:</b> Linux kernel, Libraries, Android Runtime, Application Framework, Applications.	
<b>Application Components</b>	
Activities, Services, Broadcast Receivers, Content Providers, Additional Components, Create Android	

B. Sc. Comp Sci.

Principal  
Modern College of Computer Science & IT,  
Aurangabad.

Application, Anatomy of Android Application, The Main Activity File, The Manifest File, The Strings File, The R File, The Layout File, Running the Application.

#### Unit-II:

Resources Organizing & Accessing: Alternative Resources, Accessing Resources

UI Layouts **Android Layout Types:** Relative Layout Attributes, Grid View Attributes, Sub-Activity Layout Attributes, View Identification,

**Android UI Controls:** TextView Attributes, EditText Attributes, AutoComplete TextView Attributes, Button Attributes, ImageButton Attributes, CheckBox Attributes, ToggleButton Attributes, RadioButton Attributes, RadioGroup Attributes.

#### Unit-III:

**Intents and Filters:** Intent Objects, Action, Android Intent Standard Actions, Data, Category, Extras, Flags, Component Name, Types of Intents: Explicit Intents, Implicit Intents.

**Fragments:** Fragment Life Cycle, Creating new Fragments, Fragment States, Adding Fragments to activities.

#### Unit-IV:

**Event Handling:** Event Listeners & Event Handlers, Event Listeners Registration, Styles and Themes, Defining Styles, Using Styles, Style Inheritance, Android Themes, Default Styles & Themes, Custom Components, Creating a Simple Custom Components.

#### Unit-V: Test and Tutorials

In addition to CIA, Tutorial, Seminars, Assignment & case studies are to be given for building proficiency in the course. (Respective Course in-charge should maintain the records for the same).

#### Textbook

1. Android Application Development (O'Reilly)
2. Head First Android Development: A Brain-Friendly GuideBook by David Griffiths and Dawn Griffiths

#### Online Resources

1. <https://developer.android.com/guide>
2. <https://www.tutorialspoint.com/android/index.htm>

#### Reference Book

1. Learn Android App Development by Wallace Jackson
2. Android App Development for Dummies, 3ed by Michael Burton







Course Code: CA-422T Course Title:- Computer Networks

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Prerequisites:

Basic knowledge of computer systems and programming languages.

Learning Objectives

1. Understand the fundamental concepts of computer networks and their applications.
2. Gain knowledge of the layered network architecture and various network protocols and services.
3. Understand the functions and operation of various network layers, including the physical, data link, network, transport, and application layers.
4. Gain knowledge of network security threats and vulnerabilities, as well as various security protocols and encryption techniques.

Learning Outcomes

After Completion of the Course students will be able to

1. Design and implement computer networks.
2. Analyze and troubleshoot network problems.
3. Understand various network-related problems.
4. Understand network security threats and services, encryption techniques.

Unit -I: Introduction to Computer Networks (10 Periods)

Overview of computer networks and their applications, Network topologies and architectures, Layered network architecture and the OSI reference model, Network protocols and services

Unit -II: Physical Layer and Data Link Layer (10 Periods)

Overview of the physical layer and its functions, Transmission media and their characteristics, Data encoding and modulation techniques, Error detection and correction, Data link layer and its functions, Framing, flow control, and error control in data link layer protocols.

Unit -III: Network Layer and Transport Layer (10 Periods)

Overview of the network layer and its functions, Routing algorithms and protocols, IPv4 and IPv6 addressing and routing, Transport layer and its functions, Reliable data transfer and flow control, TCP and UDP protocols.

Unit -IV: Application Layer and Security (10 Periods)

Overview of the application layer and its functions, Client-server and peer-to-peer architectures, Common application layer protocols (HTTP, FTP, SMTP, DNS), Network security threats and vulnerabilities, Cryptography and encryption techniques, Security protocols (SSL/TLS, IPsec, VPN).

Unit-V: Test and Tutorials (05 Periods)

In addition to CIA, Tutorial, Seminars, Assignments & case studies are to be given for building proficiency

the course. (Respective course In-charge should maintain the records for the same).

### Textbook

1. "Computer Networks" by Andrew S. Tanenbaum and David J. Wetherall
2. "Data Communications and Networking" by Behrouz A. Forouzan

### References:

1. "TCP/IP Protocol Suite" by Behrouz A. Forouzan
2. "Computer Networking: A Top-Down Approach" by James F. Kurose and Keith W. Ross
3. "Networking Essentials" by Jeffrey S. Beasley and Piyasat Nilkaew

### [-]Resources

1. Cisco Networking Academy: <https://www.netacad.com/courses/networking>
2. Computer Networking: Principles, Protocols, and Practice (Open Textbook): <https://www.computer-networking.info/>
3. Coursera Networking Courses: <https://www.coursera.org/courses?query=networking>
4. MIT OpenCourseWare: Computer Networks: <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-829-computer-networks-fall-2002/>

Course Code: CS-423P	Course Title: Lab Course (Lab based on CS-421T)
Total Credit: 1.5	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Sample List of experiments to be carried out based on the course CS-421T (The teacher can add three practical examples based on each unit as per the choice and feasibility. the below provided list is a sample list of experiments)

### List of Practical

(Minimum 10)

1. Practical No.1: Installing "Android Studio IDE" and "Android SDK"
2. Working with Linear Layout and UI components in Android
3. Working with Relative Layout and UI components in Android
4. Working with Table Layout and UI components in Android
5. Working with UI components (TextView, EditText, RadioButton, ToggleButton, CheckBox, RatingBar, AutoCompleteTextView)
6. Create Android Application to demonstrate button click event
7. Create Android Application to demonstrate RadioButton checked event
8. Create Android Application to demonstrate ToggleButton clicked event and change attributes of Layout/UI components
9. Create Android Application to demonstrate basic calculator activity\_main.xml
10. Design Android Application components using style sheet.



Course Code: CS-424P	Course Title: Lab Course (based on CS-422T)
Total Credits: 1.5	Marks: 50 (IA: 40 + IA: 10)
Periods: A per week (50 Minutes each)	



Sample list of experiments to be carried out based on the course CS-422T (The teacher can give these practical examples based on each unit as per the choice and feasibility, the below provided list is a sample list of experiments)

Unit 1: Introduction to Computer Networks

1. Setting up a simple LAN network using Ethernet cables and a switch
2. Configuring network settings on a Windows or Linux computer
3. Implementing network addressing using IP addresses and subnet masks
4. Setting up a wireless network using a wireless router
5. Capturing and analyzing network traffic using Wireshark

Unit 2: Physical Layer and Data Link Layer

1. Measuring and comparing the performance of different transmission media, such as twisted-pair cables, fiber optic cables, and wireless signals
2. Implementing and computing different error detection and correction algorithms, such as parity check, CRC, and Hamming code
3. Setting up a simple data link layer protocol using Python or Java
4. Implementing and analyzing different flow control algorithms, such as sliding window
5. Building and testing a simple network using virtual machines, such as stop-and-wait and

Unit 3: Network Layer and Transport Layer

1. Implementing and computing different routing algorithms, such as distance vector and link-state
2. Setting up a simple router using Linux or Cisco routers and configuring routing tables
3. Implementing and testing different network layer protocols, such as ARP and ICMP
4. Implementing and analyzing different transport layer protocols, such as TCP and UDP, using packet sniffing tools
5. Building and testing a simple client-server application using TCP or UDP, using

Unit 4: Application Layer and Security

1. Implementing and testing simple HTTP and FTP clients and servers
2. Configuring and testing a simple mail server using SMTP and POP3 protocols
3. Implementing and testing a simple DNS server using Python or Java
4. Analyzing network traffic to identify security threats and vulnerabilities using network analysis tools
5. Implementing and testing different security protocols, such as SSL/TLS, IPsec, and VPN, using virtual private networks and security appliances.

Course Code: CS-431T  
 Total Credit: 2  
 Periods: 3 per week (50 Minutes)

Prerequisites:  
 Basic Knowledge of Micros

- Course Objectives
1. Develop Excel profile
  2. Understand data analysis
  3. Use advanced Excel
  4. Learn practical skills

Course Outcomes

1. Able to analyze
2. Able to apply
3. Apply skills
4. Able to evaluate

Unit-1: Introduction

- 1. Dr.
- 2. Dr.
- 3. Dr.
- 4. Dr.
- 5. Dr.

Dr. B. S. Prasad  
 Modern College of Computer Science & IT,  
 Alwayse, Mysore

Dr. B. S. Prasad  
 Tel: 9448111111  
 Website: www.mccs.it

Course Code: CS-431T

Course Title: Data Analytics

Total Credit: 2

Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Prerequisites:  
1. Basic Knowledge of Microsoft Excel or Google sheets



**Course Objectives**

1. Develop Excel proficiency for data analytics
2. Understand data analysis concepts and techniques
3. Use advanced Excel features for data visualization
4. Learn practical skills for data-driven decision-making

**Course Outcomes**

Upon Completion of the course the students will be

1. Able to analyze data using Excel.
2. Able to effectively visualize data using advanced charting techniques
3. Apply statistical analysis techniques in business scenarios
4. Able to make data-driven decisions using advance analysis techniques.

**Unit-1: Understanding Data Analytics and Excel, Data Import & Pre-processing: (10 Periods)**

**1) Introduction to Data Analytics and Excel Basics**

- Understanding the importance of data analytics.
- Introduction to Excel as a data analytics tool
- Familiarization with the Excel interface
- 2. Data Types, Formats, and Basic Excel Functions
- Learning about data types and formats in Excel
- Introduction to Excel functions and formulas
- Practice with basic functions and formulas

**3) Data Import Techniques**

- Importing data from various sources
- Introduction to Excel's data import tools
- Hands-on practice with importing data

**4) Data Cleaning and Transformation**

- Understanding the need for data cleaning
- Techniques for data transformation and normalization
- Hands-on practice with data cleaning and transformation

**5) Handling Missing Values in Excel**

- Identifying and understanding missing values
- Methods for handling missing values in Excel
- Hands-on practice with missing value management

**6) Data Formatting in Excel**

- Introduction to data formatting in Excel
- Customizing cell formats for better data presentation
- Hands-on practice with data formatting

**7) Conditional Formatting in Excel**

- Understanding conditional formatting
- Applying conditional formatting rules to improve data visualization
- Hands-on practice with conditional formatting

**8) Advanced Excel Functions and Formulas**

- Introduction to advanced Excel functions and formulas
- Hands-on practice with advanced functions and formulas

**9) Data Analytics Techniques in Excel**

- Understanding various data analytics techniques
- Applying Excel functions and tools for data analysis

Kanpur



- Hands-on practice with data analytics techniques in Excel
- 10: Unit 1: Project and Review
- Applying the learned concepts to a real-world data analytics project
  - Review of key concepts and techniques
  - Presentation and discussion of final projects

**Unit-II: Descriptive Statistics and Data Visualization, Data Analysis Techniques: (10 Periods)**

1: Basic Statistical Functions

- Introduction to descriptive statistics
- Using basic statistical functions in Excel: COUNT(), SUM(), AVERAGE(), MEDIAN(), MODE(), MIN(), MAX(), STDEV()
- Hands-on practice with basic statistical functions

2: Frequency Distributions and Histograms

- Understanding frequency distributions and their importance
- Creating frequency distributions and histograms in Excel
- Hands-on practice with frequency distributions and histograms

3: Pivot Tables and Pivot Charts

- Introduction to PivotTables and PivotCharts
- Creating and customizing PivotTables and PivotCharts for data summarization
- Hands-on practice with PivotTables and PivotCharts

4: Basic Excel Charts for Data Visualization

- Introduction to basic Excel chart types: column, bar, line, pie, and area charts
- Creating and customizing basic Excel charts
- Hands-on practice with basic chart types

5: Advanced Chart Types and Customization

- Exploring advanced Excel chart types: scatter, bubble, radar, waterfall, and treemap charts
- Customizing chart elements and formatting for effective data visualization
- Hands-on practice with advanced chart types

6: Sorting and Filtering Data

- Introduction to sorting and filtering data in Excel
- Using sorting and filtering tools for data organization and analysis
- Hands-on practice with sorting and filtering

7: Data Validation and Data Auditing

- Understanding data validation and its importance
- Implementing data validation rules in Excel
- Introduction to data auditing tools and techniques
- Hands-on practice with data validation and auditing

8: Advanced Excel Functions for Data Analysis

- Introduction to advanced Excel functions: VLOOKUP(), HLOOKUP(), INDEX(), MATCH(), COUNTIF(), SUMIF()
- Hands-on practice with advanced functions for data analysis

9: What-If Analysis: Goal Seek

- Understanding Goal Seek and its applications
- Using Goal Seek to find input values that achieve a specific goal
- Hands-on practice with Goal Seek

10: What-If Analysis: Data Tables and Scenario Manager

- Introduction to Data Tables and Scenario Manager for what-if analysis
- Creating one-variable and two-variable data tables
- Using Scenario Manager to analyze different scenarios and their impact
- Hands-on practice with Data Tables and Scenario Manager

11: Unit 2: Project and Review

- Applying the learned concepts to a real-world data analytics project
- Review of key concepts and techniques
- Presentation and discussion of final projects

*Ravishankar*

### Unit-III: Working with Time Series Data & Regression Analysis: (10 Periods)

#### 1: Introduction to Time Series Data

- Understanding time series data and its importance
- Working with time series data in Excel: date and time functions
- Hands-on practice with time series data manipulation

#### 2: Trend Analysis and Forecasting

- Identifying trends and patterns in time series data
- Introduction to time series forecasting
- Forecasting techniques in Excel: linear and polynomial trendlines
- Hands-on practice with trend analysis and forecasting

#### 3: Smoothing Techniques: Moving Averages

- Introduction to moving averages as a smoothing technique
- Calculating simple, weighted, and exponential moving averages in Excel
- Hands-on practice with moving averages for trend analysis

#### 4: Smoothing Techniques: Exponential Smoothing

- Understanding exponential smoothing and its applications
- Implementing exponential smoothing in Excel using the "Forecast Sheet" feature
- Hands-on practice with exponential smoothing for forecasting

#### 5: Simple Linear Regression

- Introduction to simple linear regression analysis
- Using Excel's Data Analysis ToolPak to perform simple linear regression
- Interpreting regression output and understanding coefficient estimates
- Hands-on practice with simple linear regression

#### 6: Multiple Linear Regression

- Introduction to multiple linear regression analysis
- Performing multiple linear regression using Excel's Data Analysis ToolPak
- Interpreting multiple regression output and understanding coefficient estimates
- Hands-on practice with multiple linear regression

#### 7: Model Diagnostics and Validation

- Assessing the quality of regression models: R-squared, adjusted R-squared, and standard error
- Testing for assumptions: normality, linearity, multicollinearity, and homoscedasticity
- Cross-validation and model selection techniques
- Hands-on practice with model diagnostics and validation

#### 8: Nonlinear Regression Models

- Introduction to nonlinear regression models
- Implementing nonlinear regression models in Excel using the Solver add-in
- Hands-on practice with nonlinear regression

#### 9: Time Series Decomposition

- Understanding the components of time series data: trend, seasonality, and noise
- Decomposing time series data in Excel using moving averages and seasonal indices
- Hands-on practice with time series decomposition

#### 10: Advanced Time Series Forecasting Techniques

- Introduction to advanced time series forecasting techniques: autoregressive (AR) and moving average (MA) models
- Implementing advanced forecasting techniques in Excel using custom formulas and add-ins
- Hands-on practice with advanced time series forecasting techniques

#### 11: Unit 3: Project and Review

- Applying the learned concepts to a real-world data analytics project
- Review of key concepts and techniques
- Presentation and discussion of final projects

### Unit-IV: Hypothesis Testing, Confidence Intervals And Excel Add-ins for Data Analytics: (10 Periods)

#### 1: Hypothesis Testing Basics

- Introduction to hypothesis testing and its importance

B. Sc. Comp Sci.



Page 44 of 58  
Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



- Understanding null and alternative hypotheses
  - Types of hypothesis tests: one-tailed and two-tailed tests
  - Hands-on practice with hypothesis testing in Excel
- 2: Confidence Intervals
- Understanding confidence intervals and their interpretation
  - Calculating confidence intervals for means and proportions in Excel
  - Hands-on practice with constructing confidence intervals
- 3: T-Tests and Z-Tests
- Introduction to t-tests and z-tests
  - Performing one-sample, two-sample, and paired t-tests in Excel using the Data Analysis ToolPak
  - Conducting z-tests in Excel using custom formulas
  - Hands-on practice with t-tests and z-tests
- 4: Chi-Square Tests and ANOVA
- Introduction to chi-square tests for independence and goodness-of-fit
  - Performing chi-square tests in Excel using the Data Analysis ToolPak or custom formulas
  - Introduction to Analysis of Variance (ANOVA) for comparing multiple means
  - Conducting one-way and two-way ANOVA in Excel using the Data Analysis ToolPak
  - Hands-on practice with chi-square tests and ANOVA
- 5: Excel Analysis ToolPak
- Introduction to the Excel Analysis ToolPak and its features
  - Using the ToolPak for statistical analysis: t-tests, ANOVA, correlation, and regression
  - Hands-on practice with the Excel Analysis ToolPak
- 6: Power Query for Data Transformation
- Introduction to Power Query and its applications
  - Importing, cleaning, and transforming data using Power Query
  - Merging and appending queries to combine data from multiple sources
  - Hands-on practice with Power Query for data transformation
- 7: Power Pivot for Data Modeling
- Introduction to Power Pivot and data modeling in Excel
  - Creating and managing data models using Power Pivot
  - Working with calculated columns and measures using DAX (Data Analysis Expressions)
  - Hands-on practice with Power Pivot for data modeling
- 8: Power Map for Geospatial Data Visualization
- Introduction to Power Map (3D Maps) for geospatial data visualization
  - Creating interactive, 3D geospatial visualizations using Power Map
  - Customizing map layers, chart types, and visual elements
  - Hands-on practice with Power Map for geospatial data visualization
- 9: Advanced Hypothesis Testing Techniques
- Introduction to advanced hypothesis testing techniques: F-tests, Mann-Whitney U test, and Kruskal-Wallis test
  - Implementing advanced hypothesis tests in Excel using custom formulas or third-party add-ins
  - Hands-on practice with advanced hypothesis testing techniques
- 10: Data Analytics Project and Review
- Applying the learned concepts to a real-world data analytics project involving hypothesis testing, confidence intervals, and Excel add-ins
  - Review of key concepts and techniques covered in the chapters
  - Presentation and discussion of final projects

**Unit-V: Test and Tutorials (05 Periods)**

In addition to CIA, Tutorial, Seminars, Assignments & case studies are to be given for building proficiency in the course. (Respective course in-charge should maintain the records for the same).

**Textbook**

B. Sc. Comp Sci.

VC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



**References:**

1. Data Analysis with Excel Paperback – 1 January 2019 by Manish Nigam.
2. Microsoft Excel Data Analysis and Business Modelling by Wayne Winston

**Resources**

1. Microsoft Excel Help Center: This is a comprehensive resource for all things in Excel, including tutorials, how-to guides, and troubleshooting tips.
2. Excel Easy: A free online tutorial website that covers all the basics of Excel and includes step-by-step guides for common data analysis tasks.

Course Code: CS-432T	Course Title:- Open-Source Web Application Development
Total Credit: 2	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	
<b>Prerequisites:</b> Basic knowledge of HTML, CSS, and JavaScript	
<b>Learning Objectives</b>	
<ol style="list-style-type: none"> <li>1. Install and configure MySQL and Apache, and write basic PHP code to interact with them.</li> <li>2. Develop an understanding of PHP syntax, data types, and control structures, and how to work with forms, cookies, and files.</li> <li>3. Gain proficiency in advanced PHP topics such as functions, arrays, objects, and strings, dates, and time.</li> <li>4. Build dynamic web applications using PHP and integrate them with MySQL and Apache.</li> </ol>	
<b>Learning Outcomes</b>	
After Completion of the Course students will be able to	
<ol style="list-style-type: none"> <li>1. Install and configure MySQL and Apache, and write basic PHP code to interact with them.</li> <li>2. Write PHP scripts to handle form submissions, set and delete cookies, and interact with files and directories.</li> <li>3. Develop an understanding of advanced PHP topics, including functions, arrays, objects, and strings, dates, and time.</li> <li>4. Build dynamic web applications using PHP and integrate them with MySQL and Apache.</li> </ol>	
<b>Unit -I: Introduction to Web Development with MySQL and Apache (10 Periods)</b>	
Overview of web development and its components (HTML, CSS, JavaScript). Introduction to MySQL and Apache, Installing MySQL and Apache on a local machine, Basic security guidelines for MySQL and Apache.	
<b>Unit -II: PHP Basics (10 Periods)</b>	
Functions in PHP: meaning, calling, defining, and testing for existence, Arrays in PHP: creating and using arrays, and array-related functions. Objects in PHP: creating an object and object inheritance, Working with strings, dates, and time: formatting strings, using date/time functions, and other related functions.	
<b>Unit -III: Advanced PHP Topics (10 Periods)</b>	



PHP with AJAX: Introducing Ajax-Ajax Basics-PHP and Ajax-Database Driven Ajax PHP with SQL  
Basic SEO-Provocative SE Friendly URLs-Duplicate Content- CMS: Word press Creating an SE-Friendly  
Blog.

#### Unit -IV: Web Forms, Cookies, and File Handling (10 Periods)

Creating a simple input form and accessing form input with user-defined arrays, Working with HTML and PHP code on a single page, using hidden fields to save state, and redirecting the user, Introduction to cookies, setting and deleting cookies with PHP, and an overview of session functions, Working with files and directories: including files with include(), creating, deleting, opening, and validating files.

#### Unit-V: Test and Tutorials (05 Periods)

In addition to CIA, Tutorial, Seminars, Assignments & case studies are to be given for building proficiency in the course. (Respective course in-charge should maintain the records for the same).

#### Textbook

1. "PHP and MySQL Web Development" by Luke Welling and Laura Thomson
2. "Learning PHP, MySQL & JavaScript" by Robin Nixon
3. "Web Database Applications with PHP & MySQL" by Hugh E. Williams and David Lane
4. "PHP, MySQL, JavaScript & HTML5 All-in-One For Dummies" by Steve Suchring, Janet Valade, and Tricia Ballard
5. "Head First PHP & MySQL" by Lynn Beighley and Michael Morrison

#### References:

1. "PHP for the Web: Visual QuickStart Guide" by Larry Ullman
2. "PHP and MySQL: Novice to Ninja" by Kevin Yank
3. "Modern PHP: New Features and Good Practices" by Josh Lockhart

#### E-Resources

1. W3Schools (<https://www.w3schools.com/>): A popular website that offers tutorials and references on various web development technologies including HTML, CSS, JavaScript, PHP, MySQL, and more.
2. Mozilla Developer Network (<https://developer.mozilla.org/>): A comprehensive resource for web developers, offering documentation and tutorials on HTML, CSS, JavaScript, and other web technologies.
3. FreeCodeCamp (<https://www.freecodecamp.org/>): A non-profit organization that offers a free and interactive online platform to learn web development, including HTML, CSS, JavaScript, and more.
4. Codecademy (<https://www.codecademy.com/>): An online learning platform that offers interactive coding courses on various web development technologies including HTML, CSS, JavaScript, PHP, and more.

Course Code: CS-433P	Course Title: Practical Based on CS-431T
Total Credit: 1.5	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	



Sample List of experiments to be carried out based on the course CS-431T  
 The following Experiments can be performed in Microsoft Excel and/or Google Sheets

1. Clean and prepare a messy dataset for analysis using Excel's data cleaning tools.
2. Use Excel's pivot tables and charts to explore and visualize data from a large dataset.
3. Use Excel's conditional formatting to highlight important data trends and outliers.
4. Use Excel's charting tools to create a scatter plot and identify correlation between two variables.
5. Use Excel's data filtering and sorting tools to explore a large dataset.
6. Use Excel's pivot tables and charts to create a dashboard that summarizes key metrics.
7. Use Excel's text-to-columns feature to split data in a single column into multiple columns.
8. Use Excel's remove duplicates feature to identify and remove duplicate entries in a dataset.
9. Use Excel's fill handle to quickly fill in missing data in a dataset.
10. Use Excel's SUMIFS function to sum data based on multiple criteria.
11. Use Excel's COUNTIF function to count data based on a specific condition.
12. Use Excel's AVERAGEIF function to calculate the average of data that meets a specific criterion.
13. Use Excel's pivot tables to calculate total sales by region and product category.
14. Use Excel's pivot tables to calculate the average order value by customer segment.
15. Use Excel's pivot tables to calculate the top selling products by region.
16. Use Excel's line chart to plot the trend of sales over time.
17. Use Excel's bar chart to compare sales across different product categories.
18. Use Excel's pie chart to visualize the percentage breakdown of sales by region.
19. Use Excel's combination chart to plot multiple data series on a single chart.
20. Use Excel's waterfall chart to visualize the contribution of each factor to a total value.
21. Use Excel's heat map chart to visualize the correlation between multiple variables.
22. Use Excel's t-test function to compare the means of two different datasets.
23. Use Excel's regression analysis tool to build a linear regression model.
24. Use Excel's ANOVA function to compare the means of three or more datasets.

Course Code: CS-434P	Course Title: Lab Course (based on CS-432T)
Total Credit: 1.5	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Sample List of experiments to be carried out based on the course CS-432T (The teacher can add three practical examples based on each unit as per the choice and feasibility, the below provided list is a sample list of experiments)

Unit 1: Introduction to Web Development with MySQL and Apache

1. Installing MySQL and Apache on a local machine
2. Configuring Apache server settings
3. Creating a basic HTML page and displaying it in a web browser
4. Connecting to MySQL database and creating a new database
5. Creating tables and inserting data into a MySQL database
6. Displaying data from a MySQL database on a web page
7. Configuring basic security settings for Apache and MySQL

8. Creating a login page with authentication using MySQL
9. Creating a registration form and storing user data in a MySQL database
10. Using Apache to serve static files like images and videos
11. Configuring Apache to work with PHP files
12. Creating a simple PHP script to display information from a MySQL database
13. Understanding and modifying the PHP configuration file (php.ini)
14. Testing web applications with Apache and MySQL
15. Troubleshooting common Apache and MySQL errors

#### Unit 2: PHP Basics

1. Creating a basic PHP script and displaying output in a web browser
2. Using variables and data types in PHP
3. Creating and using arrays in PHP
4. Working with strings and manipulating text in PHP
5. Using control structures like if/else statements and loops in PHP
6. Creating and calling functions in PHP
7. Creating and manipulating objects in PHP
8. Handling errors and exceptions in PHP
9. Working with dates and times in PHP
10. Reading and writing files in PHP
11. Opening and handling files with PHP
12. Creating a simple login system with PHP
13. Using PHP to send emails
14. Understanding and working with sessions in PHP
15. Building a simple shopping cart with PHP and MySQL

#### Unit 3: Advanced PHP Topics

1. Creating and working with multidimensional arrays in PHP
2. Using PHP to work with JSON data
3. Understanding and using regular expressions in PHP
4. Using PHP to work with XML data
5. Creating and using namespaces in PHP
6. Implementing and using traits in PHP
7. Working with magic methods and properties in PHP
8. Understanding and using design patterns in PHP
9. Implementing a simple MVC (Model-View-Controller) architecture in PHP
10. Creating and using custom PHP extensions
11. Using PHP to work with databases other than MySQL
12. Creating a RESTful API with PHP
13. Using PHP to work with web services like SOAP and REST
14. Creating and using PHP libraries and frameworks
15. Debugging and profiling PHP code

#### Unit 4: Web Forms, Cookies, and File Handling

1. Creating a simple HTML form and processing the form data with PHP
2. Using PHP to handle user input validation and sanitization
3. Creating a file upload form and processing uploaded files with PHP
4. Using PHP to handle and manipulate images
5. Creating and using cookies in PHP
6. Implementing basic user authentication with cookies in PHP
7. Understanding and using session variables in PHP

Comp Sci.

Dr. Pravin  
 Modern College  
 Computer Science & IT  
 Aurangabad



8. Implementing advanced user authentication with sessions in PHP
9. Handling file input and output with PHP
10. Using PHP to work with ZIP files and archives
11. Implementing basic file encryption and decryption with PHP
12. Creating a simple file sharing system with PHP and MySQL
13. Working with directories and file permissions in PHP
14. Using PHP to work with remote files and resources Implementing a basic caching system with PHP

Course Code: CS-441T(C)	Course Title:- Basic Python Programing
-------------------------	--

Total Credit: 2	Marks: 50 (UA: 40 + IA: 10)
-----------------	-----------------------------

Periods: 3 per week (50 Minutes each)

**Prerequisites:**  
 Programing Methodology and Basic Programing Knowledge

**Learning Objectives**

1. Enable students to understand Python's syntax and set up their programming environment.
2. Teach core programming concepts like variables, data types, control structures, and data structures.
3. Educate students about Python-specific concepts like functions, classes, exception handling, and file operations.
4. Introduce students to Python libraries and advanced topics like list comprehensions, lambda functions, and regular expressions.

**Learning Outcomes**  
 After Completion of the Course students will be able to


1. Students will be able to comfortably use Python for programming tasks.
2. Students will develop strong problem-solving skills applicable to computational and real-world scenarios.
3. Students will be able to design and implement Python programs using OOP principles.
4. Students will be adept at using key Python libraries for numerical computation, data manipulation, and visualization.

**Unit -I: Introduction to Python and Basics of Programming (10 Periods)**

1. Introduction to Programming: Why learn Programming?
2. What is Python and Why Python?
3. Installing Python and setting up the development environment.
4. Understanding Python syntax and basic data types.
5. Variables and Operators in Python.
6. Conditional Statements: If, Else, Elif.
7. Looping Statements: While loop and For loop.
8. Python Data Structures: Lists, Tuples.
9. Python Data Structures: Sets, Dictionaries.
10. Practice and Review Session.

**Unit -II: Python Functions, File I/O, and Exceptions (10 Periods)**

1. Introduction to Functions in Python.
2. Defining Functions and Calling them.

- 
3. Function Parameters, Return Values, and Scope.
  4. Introduction to Python Modules and Packages.
  5. File Operations: Opening, reading, writing, and closing files.
  6. Introduction to Exceptions and Error Handling.
  7. Try, Except, Else, Finally blocks.
  8. Raising and catching exceptions.
  9. Introduction to the 'with' statement for simplified File I/O and exception handling.
  10. Practice and Review Session.

### Unit -III: Object-Oriented Programming in Python (10 Periods)

1. Understanding the concept of Object-Oriented Programming.
2. Classes and Objects in Python.
3. The `__init__` method, class variables, and instance variables.
4. Inheritance in Python.
5. Overriding and Overloading methods.
6. Polymorphism in Python.
7. Encapsulation: Private methods and name mangling.
8. Abstract Classes and Interfaces.
9. Exception Handling in OOP.
10. Practice and Review Session.

### Unit -IV: Libraries and Advanced Topics (10 Periods)

1. Introduction to Python Libraries.
2. Introduction to NumPy and its applications.
3. Introduction to Pandas for data manipulation.
4. Introduction to Matplotlib for data visualization.
5. Understanding List Comprehensions.
6. Introduction to Lambda functions and Map, Reduce, Filter functions.
7. Generators, Decorators, and Context Managers in Python.
8. Overview of Regular Expressions in Python.
9. Introduction to Python's Standard Library.
10. Practice and Review Session.

### Unit-V: Test and Tutorials (05 Periods)

In addition to CIA, Tutorial, Seminars, Assignments & case studies are to be given for building proficiency in the course. (Respective course in-charge should maintain the records for the same).

#### Textbook

1. "Python Crash Course: A Hands-On, Project-Based Introduction to Programming" by Eric Matthes
2. "Learn Python the Hard Way" by Zed A. Shaw
3. "Automate the Boring Stuff with Python" by Al Sweigart

#### References:

1. "Fluent Python: Clear, Concise, and Effective Programming" by Luciano Ramalho
2. "Effective Python: 90 Specific Ways to Write Better Python" by Brett Slatkin
3. "Python Cookbook: Recipes for Mastering Python 3" by David Beazley and Brian K. Jones

#### E-Resources

1. Official Python Documentation: The official Python documentation is a comprehensive resource that covers everything from basic syntax to advanced topics. [Link](#)

- Codecademy Python Course: This interactive course offers hands-on experience and covers a wide variety of Python topics. [Link](#)
- LeetCode Python Problems: Practicing problems on LeetCode can help solidify programming concepts and improve problem-solving skills. [Link](#)

Some practical exercises for each unit:

### Unit 1: Introduction to Python and Basics of Programming

- Write a Python program to print "Hello, World!"
- Write a Python program to perform basic arithmetic operations.
- Write a program to swap two variables.
- Write a Python program to check if a number is even or odd using conditional statements.
- Write a Python program to print the Fibonacci sequence up to n terms.
- Write a Python program to find the factorial of a number using a loop.
- Write a Python program that sorts a list of numbers in ascending order.
- Write a Python program to find the largest number in a list.
- Write a Python program to remove duplicates from a list.
- Write a Python program that counts the frequency of elements in a list using a dictionary.

### Unit 2: Python Functions, File I/O, and Exceptions

- Write a Python function that checks if a number is a palindrome.
- Write a Python function that accepts a string and calculates the number of uppercase and lowercase letters.
- Create a Python module with multiple functions and then import it in another Python program.
- Write a Python program that reads a file, prints the content of the file, and counts the number of lines in the file.
- Write a Python program that writes data into a file.
- Write a Python program that copies the content from one file to another.
- Write a Python program that handles a divide by zero exception.
- Write a Python program that uses try, except, else, and finally blocks.
- Write a Python program that raises a type error when the wrong data type is provided as input.
- Write a Python program that uses the 'with' statement to read a file.


### Unit 3: Object-Oriented Programming in Python

- Write a Python class that represents a rectangle, including methods for calculating its area and perimeter.
- Write a Python class with a method that checks if a string is a palindrome.
- Write a Python class with an `__init__` method, class variables, and instance variables.
- Write a Python program to demonstrate the concept of inheritance.
- Write a Python program to demonstrate the concept of method overriding.
- Write a Python program to demonstrate the concept of polymorphism.
- Write a Python program to demonstrate the concept of encapsulation.
- Write a Python program to demonstrate the concept of abstraction.
- Write a Python program to handle an exception in a method of a class.
- Write a Python program to demonstrate multiple inheritance.

### Unit 4: Libraries and Advanced Topics

- Write a Python program using NumPy to create a 2D array and perform basic operations.



- 
2. Write a Python program using Pandas to read a CSV file and perform basic data manipulation.
  3. Write a Python program using Matplotlib to plot a bar chart.
  4. Write a Python program that uses list comprehension to create a new list based on an existing one.
  5. Write a Python program that uses a lambda function and the filter() function to filter out even numbers from a list.
  6. Write a Python program that uses a generator to generate the Fibonacci sequence.
  7. Write a Python program that uses a decorator to time the execution of a function.
  8. Write a Python program that uses regular expressions to validate an email address.
  9. Write a Python program that uses the os module from the Python Standard Library to interact with the operating system.
  10. Write a Python program that uses the datetime module from the Python Standard Library to work with dates and times.

### Course Assessment (Full 50 Marks Internal Assessment)

Practical assessments are an effective way to gauge the skills and comprehension of programming concepts. Below are some practical assessment methods for a Python programming course:

1. **Coding Assignments:** The most common way to evaluate programming skills. These assignments can be small pieces of code related to the topic discussed in a particular unit. This allows students to apply the concepts they've learned.
2. **Mini Projects:** After completing a few units, students can be assigned mini projects that incorporate the topics covered. These projects should be larger than the usual coding assignments, giving the students an opportunity to combine different concepts they have learned.
3. **Code Review:** Pair up students and have them review and critique each other's code. They could check for errors, suggest better methods, or recommend different coding practices. This not only helps them learn to read others' code but also provides an understanding of best practices.
4. **Debugging Exercises:** Provide students with a piece of code that has bugs/errors in it. Their task would be to debug the code, correct it, and make it run successfully.
5. **Whiteboard Coding:** Although this is traditionally done in person, it can also be conducted virtually. Students are given a problem statement and they have to write code on-the-spot. It tests their problem-solving skills, ability to think under pressure, and their command over syntax.
6. **Peer Programming:** Pair students together to solve a problem. This can foster collaboration, improve problem-solving skills, and enhance code design skills.
7. **Timed Challenges:** This method adds an element of pressure. Students are given a time limit within which they have to solve a set of problems or tasks. This is a good way to prepare them for real-life situations, as often developers have to work under time constraints.
8. **Coding Quizzes:** These can be done online and are useful for quick revision and assessment of learning. They may consist of multiple-choice questions, fill in the blanks (code snippets), or output prediction questions.
9. **Interactive Jupyter Notebook Assignments:** Python Jupyter notebooks are great for this, as they allow you to write code and document it in one place. You can set tasks within the notebook that students need to complete.

B. Sc. Comp Sci.

U.C. Principal  
Modern College of Computer Science & I.T.  
Aurangabad



**Capstone Project:** Towards the end of the course, a final, larger project that encompasses all the areas of the curriculum can be assigned. This is typically a more complex problem statement or software development task.

Remember, the main goal is to ensure that students can not only write code but also think logically, troubleshoot issues, and understand the nuances of Python programming. These assessments will help enhance their problem-solving skills and confidence in programming.

Course Code: CS-441T(D)	Course Title:- Emotional Intelligence
Total Credit: 2	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	
<b>Prerequisites:</b> There are no prerequisites for this course	
<b>Learning Objectives</b>	
<ol style="list-style-type: none"> <li>1. Understand the concept of Emotional Intelligence and its importance in personal and professional life</li> <li>2. Develop skills for improving self-awareness, self-management, social awareness, and relationship management</li> <li>3. Apply EI skills in personal and professional settings to enhance relationships, teamwork, and leadership</li> <li>4. Create an action plan for continuous improvement of EI skills</li> </ol>	
<b>Learning Outcomes</b>	
<ol style="list-style-type: none"> <li>1. Improved self-awareness and ability to regulate emotions</li> <li>2. Enhanced social awareness and empathy</li> <li>3. Improved communication and relationship management skills</li> <li>4. Increased leadership potential and effectiveness in the workplace.</li> </ol>	
<b>Unit -I: Introduction to Emotional Intelligence (10 Periods)</b>	
<ol style="list-style-type: none"> <li>1. What is Emotional Intelligence (EI)?</li> <li>2. Why is EI important?</li> <li>3. Understanding the four components of EI: self-awareness, self-management, social awareness, and relationship management.</li> </ol>	
<b>Unit -II: Developing Self-Awareness and Self-Management Skills (10 Periods)</b>	
<ol style="list-style-type: none"> <li>1. Assessing your EI using the Emotional Intelligence Appraisal</li> <li>2. Strategies for improving self-awareness, including mindfulness and journaling</li> <li>3. Techniques for improving self-management, including stress management, emotional regulation, and impulse control.</li> </ol>	
<b>Unit -III: Developing Social Awareness and Relationship Management Skills (10 Periods)</b>	
<ol style="list-style-type: none"> <li>1. Understanding social awareness and empathy</li> <li>2. Developing relationship management skills, including communication, conflict resolution, and leadership</li> </ol>	





3. Building and maintaining positive relationships

#### Unit -IV: Applying EI in Personal and Professional Settings (10 Periods)

1. Applying EI in personal relationships, including family and friendships
2. Using EI in the workplace, including teamwork, leadership, and career development
3. Developing an action plan for improving EI skills and setting goals for personal and professional growth.

#### Unit-V: Test and Tutorials (05 Periods)

In addition to CIA, Tutorial, Seminars, Assignments & case studies are to be given for building proficiency in the course. (Respective course in-charge should maintain the records for the same).

#### Textbook

1. The Emotional Intelligence Handbook: A Complete Guide to Developing and Improving Your Emotional Intelligence by Anthony C. Mersino (2021)

#### References:

1. Emotional Intelligence: Why it can matter more than IQ by Daniel Goleman
2. Emotional Intelligence 2.0 by Travis Bradberry and Jean Greaves
3. The Emotional Life of Your Brain: How Its Unique Patterns Affect the Way You Think, Feel, and Live--and How You Can Change Them by Richard J. Davidson and Sharon Begley
4. Emotional Intelligence for Managers: Rise above the chaos of the workplace by R. Sridhar
5. The Power of Emotional Intelligence by Sanjay Singh
6. Emotional Intelligence at Work by Geetu Bharwaney
7. Mind Over Mood: Change How You Feel by Changing the Way You Think by Dennis Greenberger and Christine A. Padesky

#### E-Resources

2. Emotional Intelligence 2.0 website: <https://www.emotionalintelligence2-0.com/>
3. Greater Good Science Center at UC Berkeley: [https://ggsc.berkeley.edu/topic/emotional\\_intelligence](https://ggsc.berkeley.edu/topic/emotional_intelligence)
4. MindTools Emotional Intelligence Toolkit: [https://www.mindtools.com/pages/article/newCDV\\_59.htm](https://www.mindtools.com/pages/article/newCDV_59.htm)
5. Harvard Business Review Emotional Intelligence articles: <https://hbr.org/topic/emotional-intelligence>
6. Psychology Today Emotional Intelligence articles: <https://www.psychologytoday.com/us/basics/emotional-intelligence>

#### Course Assessment (Full 50 Marks Internal Assessment)

Assessing the effectiveness of an emotional intelligence course can be challenging, but there are several practical assessments that can be used to demonstrate the skills acquired through the course. Here are some before and after tests that could be used to assess the effectiveness of an emotional intelligence course:

1. **Self-Assessment:** Before and after the course, students could be asked to complete a self-assessment of their emotional intelligence using a standardized tool such as the Emotional Intelligence Appraisal or the Mayer-Salovey-Caruso Emotional Intelligence Test. The results of these assessments could be compared to show any changes in their emotional intelligence.
2. **Role-Play Exercises:** Before and after the course, students could be asked to participate in a

B. Sc. Comp Sci.



role-play exercise that requires them to apply emotional intelligence skills. For example, they could be asked to role-play a difficult conversation with a coworker or friend, and the before and after conversations could be compared to demonstrate any improvements in their ability to manage their emotions and respond to others effectively.

3. **Feedback from Others:** Before and after the course, students could be asked to collect feedback from colleagues, friends, or family members on their emotional intelligence skills. They could ask for feedback on specific areas, such as empathy or self-awareness, and compare the feedback to demonstrate any improvements.
4. **Case Studies:** Before and after the course, students could be asked to analyze a case study that requires them to apply emotional intelligence skills. For example, they could be asked to analyze a workplace conflict and suggest solutions that demonstrate empathy and relationship management skills. The before and after case studies could be compared to show any improvements in their ability to apply emotional intelligence skills.
5. **Group Project:** Before and after the course, students could be asked to work on a group project that requires them to apply emotional intelligence skills. For example, they could be asked to plan a community service project or organize a charity event. The before and after projects could be compared to demonstrate any improvements in their ability to work collaboratively and manage relationships effectively.

These practical assessments can help demonstrate the effectiveness of an emotional intelligence course and show how students have acquired the necessary skills to apply emotional intelligence in their personal and professional lives.

*J. S. He*  
Co-ordinator (AOC)  
Modern College of Computer Science & I.T.,  
Aurangabad.

B. Sc. Comp Sci.

*K. Waghmare*  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

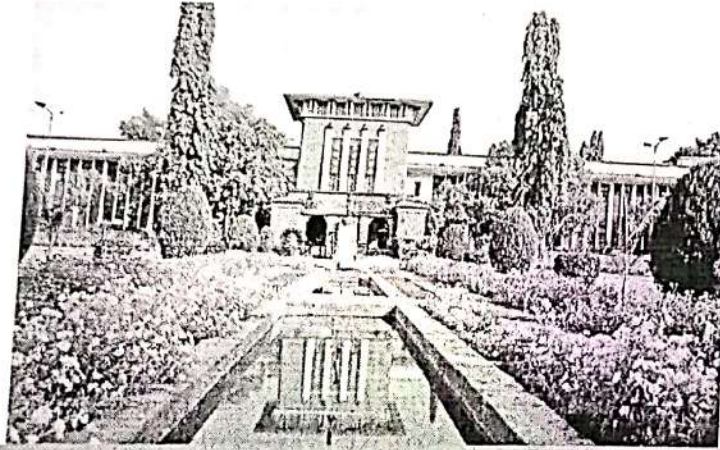


NAAC Re-accredited with Grade 'A'  
Dr. Babasaheb Ambedkar Marathwada University  
Aurangabad-431004



**REVISED SYLLABUS OF**  
**B.Sc. (Computer Science)**  
**III Year**  
**Three Year Degree Course**

(With Effective From: 2016-17)



हे ज्ञानिची पवित्रता | ज्ञानीचि आथि ||

**Dr. Babasaheb Ambedkar Marathwada University**  
Aurangabad-431004.

Tel.No. : 0240-2403400/431, Fax:0240-2403113

Website : [www.bamu.ac.in](http://www.bamu.ac.in), <http://bamua.digitaluniversity.ac.in>

*Kwaghmare*  
I/C Principal

Modern College of Computer Science & I.T.,  
Aurangabad.



## Curriculum Structure and Scheme of Evaluation: B.Sc. (C.S.)

Sr. No.	Paper Number	Name of the Paper Titles	Scheme of Teaching		Scheme of Evaluation (Marks)		
			Theory / Practical (Lect./week)	Theory / Practical (Marks)	Exam Duration (in hrs.)	Total Mark	
<b>V Semester</b>							
1	CS501-T	Software Cost Estimation	3	50	2	50	
2	CS502-T	Basic of Android O. S.	3	50	2	50	
3	CS503-T	Core Java-II	3	50	2	50	
4	CS504-T	Basic of Computer Graphics	3	50	2	50	
5*	CS505-T	Beginners Prog. with PHP	3	50	2	50	
6*	CS506-T	Basic of ASP.Net	3	50	2	50	
7 <sup>#</sup>	CS507-T	Data Mining	3	50	2	50	
8 <sup>#</sup>	CS508-T	Advanced Networking	3	50	2	50	
9	CS509-P	Pr. Based on Adv. Java	4	100	2	100	
10		Pr. Based on Comp. Graphics	4		2		
11	CS510-P	Pr. Based on Android O.S.	4	100	2	100	
12		Pr. Based on PHP/ASP.Net	4		2		
<b>VI Semester</b>							
1	CS601-T	Software Quality & Testing	3	50	2	50	
2	CS602-T	Android Application Development	3	50	2	50	
3	CS603-T	Theory of Computation	3	50	2	50	
4	CS604-T	Advanced Computer Graphics	3	50	2	50	
5*	CS605-T	Advanced Prog. With PHP	3	50	2	50	
6*	CS606-T	Programming Language: C#	3	50	2	50	
7 <sup>#</sup>	CS607-T	e-Commerce	3	50	2	50	
8 <sup>#</sup>	CS608-T	Ethics and Cyber Law	3	50	2	50	
9	CS609-P	Pr. Based on Android Develop.	4	100	2	100	
10		Pr. Based on PHP / C#	4		2		
11	CS610-P	Major Project	8	100	4	100	
12							

\* and #: Any one paper is to be opted from the group

V/C Principal  
Modern College of Computer Science & Information Technology  
Aurangabad.



### PATTERN OF QUESTION PAPERS

- Note : 1) All questions carry equal marks.  
 2) All questions are compulsory.

Q. No.	Format	Marks
1.	Multiple Choice/Fill in the blank/Match the pair/ one line answer. 1) 2) . 10)	1 x 10 = 10
2.	a) b)  OR a)	5 * 2 = 10   10
3.	a) b)  OR a)	5 * 2 = 10   10
4.	a) b)  OR a)	5 * 2 = 10   10
5.	Write Short Notes On: (Any Two ) a) b) c) d)	5 * 2 = 10
<b>Total</b>		<b>50</b>

\* Not More than 3 bits should be asked in each question of 10 Marks.

(Only for Paper Setter)

*K. Waghmare*  
 I/C Principal  
 Modern College of Computer Science & IT,  
 Aurangabad.

*B.Sc.(Computer Science)*

*Semester - V*





Course: B.Sc.(C.S.) – V Seme

Paper Code: CS-501

### Software Cost Estimation

#### Unit- I

##### Introduction

Observation on Estimation, Planning process, Software Scope and Feasibility, Types of Resources, Project estimation.

#### Unit-II

##### Decomposition Techniques

Software sizing, Problem-Based Estimation, LOC-Based Estimation with example, FP- Based Estimation with example, Process-Based Estimation with example, Designing Use Cases, Use Cases- Based Estimation with example, Estimate Reconciliation.

#### Unit-III

##### Empirical Estimation Models

Structure of Estimation Model, COCOMO Models, Software Equation, Estimation for Object-Oriented Projects, Estimation for Agile Development, Estimation for Web Projects, Creating a Decision Tree, Outsourcing.

#### Reference Books:

1. Software Engineering a Practitioner's Approach By Roger S. Pressman (Seventh Edition) McGraw Hill
2. An Integrated Approach to Software Engineering, Pankaj Jalote, Narosa.

*K. Waghmare*  
IC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

Course: B.Sc.(C.S.) – V Seme

Paper Code: CS-502

**Basic of Android Operating System**

**Unit – 1**  
SDK,

**Environment Setup:** Setup Java Development Kit (JDK), Android

Eclipse IDE, Android Development Tools (ADT) Plugin, Create Android Virtual Device, Architecture: Linux kernel, Libraries, Android Runtime, Application Framework.

**Application Components**

Application Components Activities, Services, Broadcast Receivers, Content

Providers, Additional Components, Create Android Application, Anatomy of Android Application, The Main Activity File, The Manifest File, The Strings File, The R File, The Layout File, Running the Application.

**Unit-II**

**Resources Organizing & Accessing:** Alternative Resources, Accessing Resources

**Intents and Filters:** Intent Objects, Action, Android Intent Standard Actions, Data, Category, Extras, Flags, Component Name, Types of Intents: Explicit Intents, Implicit Intents.

**UI Layouts**

Android Layout Types, Relative Layout Attributes, Grid View Attributes, Sub-Activity, Layout Attributes, View Identification, UI Controls, Android

UI Controls, TextView Attributes, AutoComplete Text View Attributes, Button Attributes, ImageButton Attributes, CheckBox Attributes, ToggleButton Attributes, RadioButton Attributes, RadioGroup Attributes.

**Unit-III**

**Event Handling:**

Event Listeners & Event Handlers, Event Listeners Registration, Styles and Themes, Defining Styles, Using Styles, Style Inheritance, Android Themes, Default Styles & Themes, Custom Components, Creating a Simple Custom Components.

*K. Waghmare*

VC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.





**Books & References:**

- 1) Android Tutorial, Simply Easy Learning by tutorialspoint.com.  
Link:[http://www.tutorialspoint.com/android/android\\_tutorial.pdf](http://www.tutorialspoint.com/android/android_tutorial.pdf)
- 2) Professional Android 4 Application Development :Retomeier, Wrox publication.
- 3) Android Apps for Absolute beginners : Wallace Jadson, Apress.
- 4) The Complete Android Guide: Kevin Purdy
- 5) Javapoint Tutorial : <http://www.javapoint.com/android-tutorial>

*Kwaghmare*  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



**Course: B.Sc. (C.S.) – V Sem**

**Paper Code: CS-402**

**Core Java-II**

**Unit – I**

**Input/Output Stream:** File, Directories, FilenameFilter, Byte stream, Character stream, InputStream, OutputStream, Working with Reader classes, InputStreamReader, BufferedReader, FileInputStream, FileOutputStream, Writer classes

**Utilities:** Simple Type Wrapper: Number, Character, Boolean,

**Enumerations:** Dictionary and StringTokenizer, Date, Math : Transcendentals, Exponential, Rounding function,

**Unit -II**

**Applets:** Introduction to Applet, Types of Applet, Applet vs Application, Applet class, advantages of Applet, Applet Lifecycle, My First Applet, Applet tag, Passing Parameters to Applet.

**Graphics: Basic Shapes:** drawLine, drawArc, fillArc, drawPolygon, fillPolygon, Color & Color Methods, Fonts.

**Unit III**

**Java Database Connectivity (JDBC):** Design of JDBC, JDBC configuration, Executing SQL statement, QueryExecution, Scrollable and updatable resultsets, row sets, metadata, Transaction Processing.

**Networking:** InetAddress, Datagrams, Socket for client and Server, URL, URL Connection.

**Reference Books:**

1. Java Complete Reference, Herbert Schildt, Seventh Edition, Tata McGraw Hill.
2. Java Handbook, Herbert Schildt, Tata McGraw Hill.
3. Java EE 6 for Beginners, Sharanam Shah, Vaishali Shah, Shroff Publishers and Distributors
4. Advanced Java™ 2 Platform How to Program by H. M. Deitel, P. J. Deitel, S. E. Santry  
Prentice Hall publication.

*Handwritten signature*  
I/C. Kinchikar  
Modern College of Computer Science B.T.,  
Aurangabad.



Course: B.Sc.(C.S.) – V Seme

Paper Code: CS-504

### Basic of Computer Graphics

#### Unit-I

##### Basics Concept in Computer Graphics

Introduction to Computer Graphics, Application of Computer Graphics, Classification of Computer Graphics, Types of Graphics Devices, Video Display Devices, Input Devices, Display File and its Structure, Display file Interpreter, Display Processor, Graphics file Format.

##### Graphics in C:

Introduction to graphics in C : initgraph(), detectgraph() and closegraph() function, Drawing object in C , Line, Circle, Rectangle, Ellipse, Changing foreground & background colors, Filling object by color function.,drawpoly, fillpoly, floodfill, getcolor, settext, outtext,style,fonts,coloring.

#### Unit-II

##### 2-D Transformation

Translation, Rotation, Scaling, Homogenous Coordinates for Translation, Homogenous Coordinates for Rotation, Homogenous Coordinates for Scaling, Composogation from 2D Transformation, Other Transformation Reflection, Shear, and Inverse Transformation.

#### Unit-III

##### Line, Circle and Character Generation

Basics concept in line Drawing, Line Drawing Algorithm, Digital Differential Analyzer, Bresenham's Line Algorithm, Antialiasing of Lines, Method of Antialiasing, Increasing Resolution, Unweighted Area Sampling, Pixel Phasing, Representation of Circle ,Polynomial Method, Trigonometric Method, Circle Drawing Algorithm, DDA Circle Drawing Algorithm, Bresenham's Circle Drawing Algorithm, Character Generation, Stroke Method, Starbust Method, Bitmap Method.

#### Text Books:

1. Procedural Elements for Computer Graphics: D.F.Rogers
2. Mathematical Elements for Computer Graphics: D.F.Rogersand J.A.Adams
3. Computer Graphics : A.P.Godse, ( IIIrd Edition) ,Technical Publication

#### Reference Books:

1. Computer Graphics by M. Pauline Baker, Donald Hearn, (2ndEdition) PHI Publication
2. Principles of Interactive Computer Graphics By. William, M. Newman. (IInd Edition) Mc.Graw Hill Publication.
3. Computer Graphics by V.K. Pachghare, (II nd Edition), Laxmi Publication

*K. K. Kulkarni*  
VC Principal

Modern College of Computer Science & I.T.,  
Aurangabad.



Course: B.Sc.(C.S.) - V Sem

Paper Code: CS-505

### Beginners Programming with PHP

- Unit-1:** Introduction to PHP: What is PHP? Why PHP? Evolution of PHP, Installation: PHP on windows and Linux, Configuring: Apache & PHP, Running & Testing PHP Script, Combining PHP with HTML, PHP Language Basics: Building blocks of PHP: Variables, Data Types, Operators and Expressions and Constant, Decision within PHP: *if*, *if.. else*, *if.. elseif .. else*, *switch*, Ternary Operator
- Unit - 2:** Looping within PHP: *while*, *do...while*, *for*, *Break* & *Continue* statement Functions in PHP: What is function, why functions, Calling function, Returning Value from function, Recursive function, Arrays in PHP: What & Why Array, Creating Array, Associative Array, Multidimensional Arrays, Accessing Array, Manipulating Arrays, Sorting Arrays, Merging Arrays,
- Unit -3:** Objects in PHP: What is Class & Object, Creating a Class & Object, Object properties, object methods, Overloading, inheritance, Constructor and Destructor. String in PHP: Creating and Accessing String, formatting String, Searching String, Manipulating String, Date and Time: Understanding TimeStamp, Getting Date and time, Extracting values of date-time, Formatting date-time.

#### Reference Books:

- 1) **Beginning PHP 5.3**, Author: Matt Doyle, Wiley Publishing, Inc.
- 2) **SAMS Teach yourself PHP in 24 hours**, Author: Matt Zandstra, Sams Publishing.
- 3) **"PHP, MySQL and Apache All in One"**, Author: Julia C. Meloni, SAMS series

V.C. Principal  
Modern College of Computer Science & IT,  
Aurangabad.



Course: B.Sc.(C.S.) – V Seme

Paper Code: CS-506

Core Java-II

**Unit – I**

**Stream:** Byte stream, Character stream, InputStream, OutputStream, Working with Reader classes, InputStreamReader, BufferedReader, FileInputStream, FileOutputStream, Writer classes

**Applets :** Introduction to Applet, Types of Applet, Applet vs Application, Applet class, advantages of Applet, Applet Lifecycle, My First Applet, Applet tag, Passing Parameters to Applet

**Unit – II**

**Swing:** Introduction to JFC (Java Foundation Classes), Swing, Swing Features, JComponent, JApplet, JFrame, JPanel, JButtons, Jcheckboxes and JRadiobuttons, JTextField, JMenu, JMenuBar, JMenuItem, JOptionPane

**Java Database Connectivity (JDBC):** Design of JDBC, JDBC configuration, Executing SQL statement, QueryExecution, Scrollable and updatable resultsets, row sets, metadata, Transaction Processing

**Unit – III**

**Servlets:** Servlet Overview and Architecture, Interface Servlet and the Servlet Life Cycle, Handling HTTP get Requests, Handling HTTP post Requests, Redirecting Requests to Other Resources, Session Tracking, Cookies, Session Tracking with HttpSession

**JavaServer Pages (JSP):** Introduction, JavaServer Pages Overview, First JavaServer Page Example, Implicit Objects, Scripting, Standard Actions, Directives, Custom Tag Libraries

**Reference Books:**

1. Java Complete Reference, Herbert Schildt, Seventh Edition, Tata McGraw Hill.
2. Java EE 6 for Beginners, Sharanam Shah, Vaishali Shah, Shroff Publishers and Distributors
3. Advanced Java™ 2 Platform How to Program by H. M. Deitel, P. J. Deitel, S. E. Santry  
Prentice Hall publication.

*K. S. Kulkarni*  
H.C. Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



Course: B.Sc.(C.S.) - V Sem

### Data Mining

#### Unit - 1

##### Data Mining Introduction:

What is Data Mining?, Definition, DBMS Vs Data Mining, DM Techniques, Issues and Challenges in DM, DM Application Areas, DM Applications- Case Studies, Current Trends Affecting DM, Basic Data Mining Task.

#### Unit - 2

##### Association Rules:

What is an Association rule?, Method to discover Association Rule, A Priori Algorithm, Partition Algorithm.

**Clustering Techniques:** Clustering Paradigm, Partitioning Algorithm, Similarity and Distance Measure, Hierarchical Algorithm.

#### Unit - 3

**Decision Trees:** What is a decision tree? Tree Construction Principle, Best Split, Splitting indices, Splitting Criteria

**Web Mining:** Introduction, Web Content Mining, Web Structure Mining, Web Usage Mining.

#### References:

1. Data Mining Techniques : Arun K. Pijari,
2. Data Mining: Introductory and Advanced Topics: M.H. Dunham Pearson Education.
3. Data Mining: Concepts & Techniques, Morgan Kaufman, 2006

Principal  
Modern College of Computer Science & IT  
Aurangabad



Course: B.Sc.(C.S.) - V Seme

Paper Code: CS-50H

### Advanced Networking

#### Unit I

**The OSI reference model:** concept of layers, protocols, interfaces and services, TCP/IP model.

**Data Link Layer:** Error correction & detection, Types of errors, Detection VS Correction, Block Coding, Linear Block codes(single parity check, hamming codes), Cyclic codes, CRC Encoder & Decoder, CRC Polynomial, Checksum.

**Data Link Control & Protocols:** Framing, Flow & Error Control, Simplest, Stop-N-Wait, Stop-N-Wait ARQ, Go Back N ARQ, Selective Repeat ARQ, Piggybacking, HDLC

#### Unit II

**Network Layer:** Logical addressing, IPv4 Addresses, Classful & Classless addresses, NAT, IPv6 Addressing.

**Network layer protocol:** Internetworking, IPv4, IPv4 protocol packet format, IPv6 Protocol & Packet format, IPv4 VS IPv6, Transition from IPv4 to IPv6, Address

**Resolution protocols:** (ARP, RARP), BOOTP, DHCP, Routing Protocols - Delivery, forwarding, routing, types of routing, routing tables, Unicast Routing, Unicast Routing protocols, RIP, Concepts of OSPF, BGP & Multicast Routing

#### Unit III

**Transport Layer:** Process to process delivery, UDP, TCP.

**Congestion Control & Quality of Service:** Data traffic, Congestion, Congestion Control (Open Loop, Closed Loop & Congestion control in TCP), QoS and Flow Characteristics.

**Application Layer:** DNS, Remote Logging(Telnet), SMTP, FTP, WWW, HTTP

#### Reference:

- 1) Data Communication & Networking (Forouzan) , Tata McGraw-Hill Education

#### Additional Reference:

- 1) Computer Networks and Internets - Douglas Comer, Prentice Hall
- 2) Computer Networks - Andrew Tanenbaum, Prentice Hall

*K. K. Kulkarni*

H/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



BCS-III year Syllabus(1)

Course: B.Sc.(C.S.)

Topic: Pr. Based on Adv. Java

Semester : V

Paper No.: CS509P (A)

Minimum 10 Practicals to be performed as per the guidelines of teaching Faculty depending upon all theory units of concerned subject.

Course: B.Sc.(C.S.)

Topic: Pr. Based on Computer Graphics

CS509P (B)

Semester : V

Paper No.:

Minimum 10 Practicals to be performed as per the guidelines of teaching Faculty depending upon all theory units of concerned subject.

Course: B.Sc.(C.S.)

Topic: Pr. Based on Android O.S.

Semester : V

Paper No.: CS510P (A)

Minimum 10 Practicals to be performed as per the guidelines of teaching Faculty depending upon all theory units of concerned subject.

Course: B.Sc.(C.S.)

Topic: Pr. Based on PHP/ASP.Net

Semester : V

Paper No.: CS510P (B)

Minimum 10 Practicals to be performed as per the guidelines of teaching Faculty depending upon all theory units of concerned subject.

*Ashe*  
Co-ordinator

Western College of Computer Science & I.T.,  
Aurangabad.

*Vijay Kumar*  
Vice Principal  
Western College of Computer Science & I.T.,  
Aurangabad.





# B.Sc.(Computer Science)

## Semester -VI

*Kwaghmare*  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



Course: B.Sc.(C.S.) – VI Seme

Paper Code: CS-601

## Software Quality and Testing

### Unit-I

#### Quality Concepts

Software and Quality, Garvin's Quality Dimensions, McCall's Quality Factors, ISO 9126 Quality Factors, Risk, Quality and Security, SE Methods, Project Management Techniques, Quality Control and Assurance

#### Quality Assurance

Elements of Software Quality Assurance, SQA Task Goals and Matrices, Formal Approach to SQA, Six Sigma for SE, ISO 9000 Quality Standards, SQA Plan.

### Unit-II

#### Software Testing Strategies

Verification and Validation, Picture of Software Testing Strategies, Criteria for compilation of testing, Strategies issue, Strategies for Conventional Software and Web Apps, Validation Testing, System Testing, Debugging.

### Unit-III

#### Testing Conventional Applications

Testing Fundamentals, Internal and External view, White-Box Testing, Basic Path Testing, Control Structure Testing, Black-Box Testing, Testing Client-Server Architecture.

#### Testing Web Applications

Dimensions of Quality, Errors within a Web App, Testing Strategy and planning, Testing process, Content Testing, Database Testing, User Interface Testing, Navigation Testing, Configuration Testing, Load Testing, Stress Testing.

#### Reference Books:

1. Software Engineering a Practitioner's Approach By Roger S. Pressman (Seventh Edition) McGraw Hill.
2. An Integrated Approach to Software Engineering, Pankaj Jalote, Narosa.



Course: B.Sc.(C.S.) – VI Seme

Paper Code: CS-602

### Android Application Development

**Unit I: Android SDK Features**  
 Access to Hardware including Camera, GPS, and Accelerometer, Native Google Maps, Geocoding, and Location-Based Services, Background Services, SQLite Database for Data Storage and Retrieval, Shared Data and Interapplication Communication, P2P Services with Google Talk, Extensive Media Support and 2D/3D Graphics, Optimized Memory and Process Management, The Dalvik Virtual Machine, Advanced Android Libraries.

#### Android Development Tools

Types of Android Applications, Hardware-Imposed Design Considerations, Users, Environment, The Android Emulator, Dalvik Debug Monitor Service (DDMS), The Android Debug Bridge (ADB).

**Unit II: Applications and Activities:**

Application Manifest, Manifest Editor, Android Application Life Cycle, Understanding Application Priority and Process States, Externalizing Resources, Fundamental Android

**UI Design:** The Android Widget Toolbox, Layouts, Compound Controls, Custom

Widgets and Controls, Android Menu System, Activity Menu, Intents, Broadcast Receivers, Adapters, and the Internet; Intents to Launch Activities, Intent Filters to Service Implicit Intents, Intent Filters for Plug-ins and Extensibility, Intents to Broadcast Events, Android-Supplied Adapters, Internet Resource.

#### Data Storage, Retrieval, and Sharing

Creating and Saving Preferences, Retrieving Shared Preferences, Saving the Activity State, File Management Tools, Databases in Android; SQLite, Cursors and Content Values, Content Providers.

Maps, Geocoding, and Location-Based Services: Location Providers, Geocoder, Map-Based Activities.

6-32609-01  
 J. K. Patil  
 Principal

*K. V. Patil*  
 VC Principal  
 Modern College of Computer Science & I.T.,  
 Aurangabad.



**Unit III: Advanced Development in Android:**

Controlling Services, Threads, Customizing Toasts, Toasts in Worker Threads, Notification Manager, Triggering Notifications. Peer-to-Peer Communication: Android Instant Messaging, Sending & Listening SMS. Accessing Android Hardware: Media APIs, Controlling Camera Settings, Sensor Manager, Accelerometer and Compass, Android Telephony, Bluetooth, Managing Network and Wi-Fi Connections. Advanced Android Development: Paranoid Android, AIDL to Support IPC for Services, Internet Services, Rich User Interfaces.

**Books & References:**

- 1) Android Tutorial, Simply Easy Learning by tutorialspoint.com.  
Link: [http://www.tutorialspoint.com/android/android\\_tutorial.pdf](http://www.tutorialspoint.com/android/android_tutorial.pdf)
- 2) Professional Android 4 Application Development :Retomeier, Wrox publication.
- 3) Android Apps for Absolute beginners : Wallace Jadson, Apress.
- 4) The Complete Android Guide: Kevin Purdy

Javapoint Tutorial : <http://www.javapoint.com/android-tutorial>

*K. S. Ghosh*  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



Course: B.Sc.(C.S.) – VI Seme  
603

## Theory of Computation

### Unit-I

**Introduction:** Sets, relations, functions, graphs, trees, mathematical induction.

**Regular expressions:** FA and regular expression, pumping lemma for regular sets, applications of pumping lemma, closure properties of regular sets, regular sets and grammar, types of grammar (type 0, type 1, type 2, type 3)

### Unit-II

**Finite automata:** definition, transition systems, acceptability of strings, NFA, DFA, equivalence of DFA and NFA, mealy moore model, minimization of automaton, Applications.

### Unit-III

Formal Languages, Chomsky classification of languages, languages, their relation and automaton.

### Reference Books

1. J E Hopcroft, R Motwani and J D Ullman, Introduction to Automata theory, Languages and Computation, Pearson Education Asia, 2003.
2. Daniel A Cohen, Introduction to Computer Theory, Hardcover (1990) by John Wiley & Sons
3. K. L P Mishra, N Chandrashekharan, Theory of Computer Science, PHI 2001
4. Martin John C, Introduction to Language and Theory of computations (TMH) 2004

  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



Course: B.Sc.(C.S.) – VI Sem

Paper Code: CS-604

### Advanced Computer Graphics

#### Unit-I

##### 3-D Transformation

Translation, Scaling, Rotation, Shearing, Reflection, Multiple Transformation Projection, Perspective Projection, Parallel Projection, Types of Parallel & Perspective Projection, Vanishing Points, Diffuse Illumination, Specular Reflection.

#### Unit-II

##### Curves and Fractals

Curve Generation, Representation of Parametric & Non-Parametric Curves, Spline Representation Parametric Representation of Circle & Ellipse, Bezier curves, B-Spline curves Fractals, classification of fractals, Topological Dimension, fractal Dimension, Hilbert's curves, Koch curve.

#### Unit-III

##### Colour Model and Animation

Properties of Light, CIE Chromaticity Diagram, Colour Primary Systems, Color Matching Experiments, Colour Models: RGB, CMY and HSV, Introduction of Animation, Animation Using Colour Table, Animation of Wireframe Models.

#### Text Books:

1. Procedural Elements for Computer Graphics: D.F.Rogers
2. Mathematical Elements for Computer Graphics: D.F.Rogers and J.A.Adams
3. Computer Graphics by M. Pauline Baker, Donald Hearn, (2nd Edition) PHI Publication

#### Reference Books:

1. Computer Graphics: A.P.Godse, (11th Edition), Technical Publication
2. Principles of Interactive Computer Graphics By. William. M. Newman. (11th Edition) Mc.Graw Hill Publication.
3. Computer Graphics by V.K. Pachghare, (11th Edition), Laxmi Publication

*Kanaghmare*  
Principal  
Modern College of Computer Science & IT,  
Aurangabad.



**Course: B.Sc.(C.S.) – VI Seme**

**Paper Code: CS-605**

**Advanced Programming with PHP**

**Unit-I:** Handling HTML Forms in PHP: Creating HTML Form, Capture Data Sent,

Handling: Empty form data, Multi-Value fields, Validating Form Data, Difference between GET and POST, Global and Environment Variables, Generating Web-form in PHP, Create Multi-step Form, Hidden fields, Redirecting the user.

**Unit – II:** Cookies and user sessions in PHP: State and Stateless Webpage,

Deleting a

cookies, Creating Session Cookies,

QueryString: Working with QueryString, Creating QueryString.

Session: Using PHP Session to Store Data: Creating a Session, Reading & Writing Session Data, Destroying a Session, Create a User Login System.

**Unit – III:** Introducing Database and SQL: Basics of MySql, Connecting to the Database Server, Creating Database, Creating Table.

Retrieving data: Limit the number of results returned, Order and group results, Query multiple tables at once, Use various MySQL functions and other features to build more flexible queries

Manipulating data from SQL with PHP: Inserting new records into tables using INSERT statements, changing field values within records with UPDATE statements, deleting records using DELETE statements.

**Reference Books:**

- 1) **Beginning PHP 5.3**, Author: Matt Doyle, Wiley Publishing, Inc.
- 2) **SAMS Teach yourself PHP in 24 hours**, Author: Matt Zandstra, Sams Publishing.
- 3) **“PHP, MySQL and Apache All in One”**, Author: Juliea C. Meloni, SAMS series

10/10/19 11:11 AM  
 Modern College of Computer Science & IT, Aurangabad

*K. S. Kulkarni*  
 HC Principal  
 Modern College of Computer Science & IT,  
 Aurangabad.



BCS-III year Syllabus(1)

Course: B.Sc.(C.S.) – VI Seme

Paper Code: CS-606

Programming Language: C Sharp

**UNIT I :**

Introduction : Basic Concepts, Features, Common Language Specification

C# Types: Simple type, Struct type, Object type Class type, Interfaces, String type, Arrays , Boxing & unboxing Conversions , Implicits , Explicits , Standard & User Defined Conversions.

**UNIT II :**

Control Statements : Selection Statements – if , Switch, Iteration Statements – For, For-Each, While , Do statements.

Classes & Methods : Constructors & Destructors ,Methods-Parameters, Overriding, Hiding class properties , Indexes , Modifiers, Class member Access, Multi cast delegates

Inheritance & Polymorphism : Inheritance- Basic class & Derived Class , Polymorphism , Base class with Virtual method, Derived class with override methods

**UNIT III :**

Interfaces: Base, body , members , methods , properties , events, indexes, mapping, implementation

Exception Handling : Checked & Unchecked statements, compiler settings for overflow checking , Programmatic overflow checking , Exception handling statements – try & catch , try & finally , try- catch- finally , throwing exception & rethrowing exception

**Reference Books :**

1. C# : A Beginners Guide – Childt , Herbert ( Tata Mcgraw Hill , New Delhi )
2. C# The basics , Vijay Mukhi ( BPB Publications)
3. C# Programming ( Wrox Publications)
4. C# Programming Black Book – Matt Telles (DreamTech Publications)

VIC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



Course: B.Sc.(C.S.) – VI Sem

Paper Code: CS-607

**E-Commerce**

**Unit-I**

Introduction, IT and business, E-commerce: Concepts Electronic Communication, PCs and Networking, E-mail, Internet and intranets. EDI to E-commerce, EDI, UN/EDIFACT

**Unit-II**

Concerns for E-commerce Growth, Internet bandwidth, Technical issues, Security issues, India E-commerce Readiness, Legal issues, Getting started.

Security Technologies: Encryption, Symmetric key Encryption, Public key encryption, Public key encryption using digital Signatures. Hashing techniques, Certification and key Distribution, Cryptographic.

**Unit-III**

The elements of E-commerce. SSL-Secure Socket Layer, SET-Secure Electronic Transaction Protocol for Credit card payment, E-Cash, E-check, Smart cards.

Electronic Payment System: Digital Cash, Digital Wallets, Digital checking payment systems, Electronic Billing, Wireless payment systems.

Software Package: PGP e-mail encryption software

**Textbook:**

1. E-Commerce: The Cutting Edge of Business, Kamlesh K. Bajaj & Debjani Nag, Tata McGraw Hill.
2. E- Commerce Strategy , Technologies and Applications, David Whiteley, McGraw Hill Edition

**Reference Books:**

1. E- Security, Electronic Authentication and Information Systems Security Sundeep Oberoi, TMG
2. E-Commerce Concepts, Models , Strategies by - G.S.V Murthy
3. E-Commerce- Kenneth C.Laudon and Carol Guercio Traver
4. Internet marketing and E-commerce-Ward Hanson and Kirthi Kalyanam



Course: B.Sc.(C.S.) – VI Seme

Paper Code: CS-608

## Ehtics & Cyber Law

### Unit-I

Basic Concepts of Technology and Law, Understanding the Technology of Internet, Scope of Cyber Laws, Cyber Jurisprudence. Law of Digital Contracts The Essence of Digital Contracts.

### Unit-II

The System of Digital Signatures. The Role and Function of Certifying Authorities. The Science of Cryptography, E-Governance, Cyber Crimes and Cyber Laws. Introduction to Intellectual Property.


### Unit-III


#### Information Technology Act 2000 Cyber Law

Issues in E-Business Management. Major issues in Cyber Evidence Management, Cyber Law Compliancy Audit, The Ethics of Computer Security. Relevant Rules Notifications, Information Technology (Amendment) Act, 2008.

### Text books:

1. Godbole, "Information Systems Security", Willey
2. Merkov, Breithaupt, "Information Security", Pearson Education
3. Yadav, "Foundations of Information Technology", New Age, Delhi
4. Schou, Shoemaker, "Information Assurance for the Enterprise", Tata McGraw Hill
5. Sood, "Cyber Laws Simplified", Mc Graw Hill
6. Furnell, "Computer Insecurity", Springer

  
Co-ordinator  
Modern College of Computer Science & I.T.,  
Aurangabad.

  
PrinCipal  
Modern College of Computer Science & I.T.,  
Aurangabad.



Course: B.Sc.(C.S.)

Semester : VI

Topic: Pr. Based on Android Development

Paper No.: CS609 P (A)

Minimum 10 Practicals to be performed as per the guidelines of teaching Faculty depending upon all theory units of concerned subject.

Course: B.Sc.(C.S.)

Semester : VI

Topic: Pr. Based on PHP/C#

Paper No.: CS609 P (B)

Minimum 10 Practicals to be performed as per the guidelines of teaching Faculty depending upon all theory units of concerned subject.

Course: B.Sc.(C.S.)

Semester : VI

Topic: Major Project

Paper No.: CS610

**Note:**

- 1) It is expected that concerned Faculty is to introduce and make the students aware about the Project Development Environment as well as distribute all the students in group with minimum 2 and maximum 4 student's strength.

**Minimum contents of Project Report**

1. Introduction
2. Problem definition.
3. System Requirement Specification
  - 3.1. User Interview
  - 3.2. Current System flow diagram
  - 3.3. Proposed System.
4. E-R Diagram
5. DFD
6. Sample Screens
7. Conclusion

\*\*\*

S\*/-170516/-

*Rwaghman*  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

**DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY,  
AURANGABAD [M.S.] INDIA.**



**CIRCULAR/SYLL/CONSTITUTION OF INDIA/ I Yr/2020.**

It is hereby inform to all concerned that, the Academic Council at its meeting held on 31st December, 2019 has accepted the Curriculum of "Constitution of India" at First Year College level as per Appendix-'A'.


**This is effective from the Academic Year 2020-21 and Onwards.**

All concerned are requested to note the contents of this circular and bring notice to the students, teachers and staff for their information and necessary action.

Encl.: - Syllabus.

University campus,  
Aurangabad-431 004.  
Ref. No. SU/Con./I Yr/Cur./  
2020/ 7416 - 25.  
Date: 28.01.2020.

}}  
}}  
}}  
}}  
\*\*\*\*\*


  
**Deputy Registrar,  
Academic [Syllabus]  
Section.**

**Copy forwarded with compliments to:-**

- 1] **The Principals, all affiliated Colleges,**  
Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.
- 2] **The Director, University Network & Information Centre, UNIC, with  
a request to upload this Circular on University Website.**  
**Copy to :-**
  - 1] The Director, Board of Examinations & Evaluation,
  - 2] **The Section Officer, [B.A. Unit] Examination Branch,**
  - 3] The Section Officer, [Eligibility Unit],
  - 4] **The Programmer [Computer Unit-1] Examinations,**
  - 5] **The Programmer [ Computer Unit-2] Examinations,**
  - 6] The In-charge, [E-Suvidha Kendra],
  - 7] The Public Relation Officer,
  - 8] The Record Keeper,Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

HF\*280120/-

--\*\*--

  
**I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.**



Appendix

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD.

\* COMPULSORY COURSE TO THE UNDER GRADUATE STUDENTS OF AFFILIATED AND CONDUCTED COLLEGES OF UNIVERSITY

[Subject Code: IIC 001]

02 Credits

**AN INTRODUCTION TO INDIAN CONSTITUTION**

**Unit I**

1. Meaning and Concept of Indian Constitution
2. Nature of Constitution
3. Brief Idea of Indian Constitution  
[Parts, Articles and Schedule]

**Unit II**

**Silent Features of Indian Constitution**

1. Written and Enacted Constitution; 2. The longest and most detailed Constitution of the World; 3. Rigidity and Flexible Constitution; 4. Parliamentary system of Government; 5. Federal system with unitary bias; 6. Adult Franchise; 7. Single Citizenship; 8. Sovereign, Democratic, Republic; 9. Secularism; 10. Directive Principles of State Policy; 11. Independent Judiciary; 12. Fundamental Rights; 13. Fundamental Duties.

**Unit III**

**A. Fundamental Rights**

1. Concept of State (Art. -12); 2. Right to Equality (Art. -14 to 18); 3. Right to Freedom (Art. -19 to 22); 4. Right against Exploitation (Art. -23 & 24); 5. Right to Religion (Art. -25 to 28); 6. Right of Minorities (Art. -29 & 30); 7. Constitutional Remedies (Art.-32).

**B. Fundamental Duties (Art.-51 A)**

**Unit IV**

**Directive Principles of State Policy (DPSP's)**

1. Meaning and Significance of Directive Principles.
2. Classification/ Principles of D.P.S.P.
3. Relationship between F.Rs. and D.P.S.P.

**Unit V**

**Executives**

**A) Union Government**

The President, Council of Ministers and Prime Minister.

**B) State Government**

The Governor, Council of Ministers and Chief Minister.

1 | Page

*Kwaghmare*  
H/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

### References

1. Constitution of India, Bare Act. Govt. of India.
2. Subhash C Kashyap, Our Constitution (AN Introduction of Indian Constitution and Constitutional Law, National Book Trust, India 2001.
3. Avasthi & Maheshwari, Indian Constitution, Lakshmi Narain Agrawal Agra, 2017.
4. Basu D.D., Introduction to the Constitution of India, Lexis Nexis, 2013.
5. Sharma L.N. Indian Prime Minister, the Macmillan Company of India, 1976.
6. Jain H.M. Union Executive, Chaitanya Publishing House, 1969.
7. Dr. S.N. Busi, Dr. B.R. Ambedkar, Framing of Indian Constitution, 1<sup>st</sup> Edition, 2015.
8. M.P. Jain, Indian Constitution Law, 7<sup>th</sup> Edn., Nexis 2014.
9. M.P. Jain, Outlines of Indian Legal and Constitutional History, Lexis Nexis, 2014.
10. भारताचे संविधान.  
नागपूर २००६.
11. प्रदिप गायकवाड, (संपादक) भारताचे संविधान शिल्पकार डॉ. बाबासाहेब आंबेडकर दिक्षाभूमी संदेश, पुणे २०१३.
12. ग्रॅनव्हिल ऑस्टिन, अनुवाद भारती केंळकर भारताची राज्यघटना, राष्ट्राची कोणशिला, डायमंड पब्लिकेशन, पुणे २०१३.
13. डॉ. भा.ल. भोळे, भारताचे शासन आणि राजकारण, विद्या प्रकाशन, नागपूर.

**Note: All latest volumes of above mentioned books must be preferred. The above list of books is not an exhaustive one.**

10 Marks  
10 Marks  
30 Marks

Internal Test (45 Minutes)  
Home Assignment  
Theory Paper (02 Hours)

[1]	Section - [A]	Ten MCQ Carrying One Mark each	10 Marks
[2]	Section - [B]	Two Short Questions Carrying 5 Marks each Out of Five Questions Students have to Attempt any two	10 Marks
[3]	Section - [C]	One Long Question, Out of Three Questions Students have to attempt any one	10 Marks

**Note: - This Course is bilingual (English & Marathi)  
The Examination will also be bilingual.**



**CIRCULAR NO.SU./B.Sc.CBC & GS/11/2022**

It is hereby inform to all concerned that, on the recommendation of Faculty of Science & Technology Meeting dated 24.08.2022, the Academic Council at its meeting held on 29 August 2022 has accepted the following Syllabi of B.Sc. Degree under the Choice Based Credit & Grading System along with Rules and Regulation as appended herewith:-

1.	B.Sc.Computer Science (Optional)	Ist and IInd semester
2.	B.Sc.Computer Application (Optional)	Ist and IInd semester
3.	B.Sc.Computer Application (Degree)	Ist and IInd semester
4.	B.Sc.Computer Science (Degree)	Ist and IInd semester
5.	B.Sc.Horticulture (Optional)	Ist to VIth semester
6.	B.Sc.Botany (Optional)	Ist to VIth semester
7.	B.Sc. Agrochemical & fertilizer (Optional)	Ist to VIth semester
8.	B.Sc.Home Science (Optional)	Ist and IInd semester
9.	B.Sc.Automobile Technology (Degree)	Ist and IInd semester
10.	B.Sc.Workshop Technology (Degree)	Ist and IInd semester
11.	B.Sc.Refrigeration and Air Conditioning (Degree)	Ist and IInd semester
12.	B.Sc.Environmental Science (Optional)	Ist and IInd semester
13.	B.Sc.Biotechnology (Degree)	Ist and IInd semester
14.	B.Sc.Biotechnology (Optional)	Ist and IInd semester
15.	B.Sc.Dairy Sci.& Tech (Optional)	Ist and IInd semester
16.	B.Sc.Zoology (Optional)	Ist to VIth semester
17.	B.Sc.Polymer Chemistry (Optional)	Ist and IInd semester
18.	B.Sc.Fisheries Science (Optional)	Ist and IInd semester
19.	B.Sc.Instrumentation Practice (Optional)	Ist semester
20.	B.Sc.Biochemistry (Optional)	Ist and IInd semester
21.	B.Sc.Non Conventional & Conventional Energy (Degree)	Ist and IInd semester

This is effective from the Academic Year 2022-23 and onwards.

All concerned are requested to note the contents of this circular and bring notice to the students, teachers and staff for their information and necessary action.

University Campus,  
Aurangabad-431 004.  
Ref.No. SU/B.Sc./2022/8428-35  
Date:-29.08.2022.

\*  
\*  
\*  
\*  
\*  
\*\*\*\*\*

*[Signature]*  
Deputy Registrar,  
Academic Section *[Signature]*  
I/C-Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

7  
::2::

Copy forwarded with compliments to :-

- 1] The Principal, concerned affiliated College,  
Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.
- 2] The Director, University Network & Information Centre, UNIC, with a  
request to upload this Circular on University Website.

Copy to :-

- 1] The Director, Board of Examinations & Evaluation,
- 2] The Section Officer, [B.Sc.Unit] Examination Branch,
- 3] The Programmer [Computer Unit-1] Examinations,
- 4] The Programmer [Computer Unit-2] Examinations,
- 5] The In-charge, [E-Suvidha Kendra],  
Rajarshi Shahu Maharaj Examination Branch,
- 6] The Public Relation Officer,
- 7] The Record Keeper,

IS\*20/8/2022-





**Dr. Babasaheb Ambedkar Marathwada University**  
Aurangabad - 431004 (MS) India



**Undergraduate Bachelor Degree Program**  
**in Science (B. Sc.)**  
Environmental Science (Optional Subject)

**Course Structure and Curriculum**  
**(Outcome based Curriculum)**

Choice Based Credit System  
(Effective from Academic Year 2022-23)

**Dr. Babasaheb Ambedkar Marathwada University**  
Aurangabad – 431004 (MS) India

*Handwritten text in Marathi, partially illegible.*

*Handwritten signature.*

*K. Waghmare*  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



# INDEX



Sr. No.	Contents	Pg. No.
1	Preamble	
2	Course Structure	1-2
3	Vision	5-10
4	Mission	
5	Program Educational Objectives	
6	Program Outcome and Programme Specific Outcomes	
7	Eligibility	
8	Duration	
9	Medium of Instructions	
10	Choice Based Credit System, Credit- to -Contact Hour mapping ...	
11	Attendance	
12	Evaluation Methods / Scheme of Examination, Earning Credits, Grading System	
13	Curriculum: Semester – I	
14	Curriculum: Semester – II	
15	Curriculum Semester – III	
16	Curriculum Semester – IV	
17	Curriculum Semester – V	
18	Curriculum Semester – VI	



## I. Preamble

The course curriculum for undergraduate studies under choice based credit system (CBCS) for B.Sc. in Environmental Science is framed in this document. This exercise was undertaken as part of the nationwide curriculum restructuring initiative by the National Education Policy.

As enshrined in the National Education Policy vision of introducing course curriculum for undergraduate studies under Choice Based Credit System (CBCS), the main objective of framing this curriculum of B.Sc. in Environmental Science is to impart the students a holistic understanding of the subject giving substantial weightage to the core contents, skill, value-based and ability enhancement. The syllabus has given due importance on the main streams of the body of knowledge on 'Environment' with due recognition of its wide spectrum. The ultimate goal of the syllabus is to enable the students to have an in-depth knowledge on the subject and enhance their scope of employment at every level of exit. Adequate emphasis has been given on the new and emerging techniques and understanding of the subject under the changing regime and global context.

There is need to strengthen the students to understand essential aspects of environmental science in diverse subject areas such as ecology, environmental chemistry, environmental pollution, environmental geo-science, atmospheric sciences, biodiversity, natural resources management, global warming, climate change and waste management. The curriculum lays focus on creating new knowledge, acquiring new skills and capabilities in Environmental Science producing an intelligent human resource serving the Environment and society, focusing on problem solving critical thinking, team work and collaboration. There is also an additional emphasis in providing opportunities to understand the integration of modern disciplines such as environmental modeling, geographical information systems and remote sensing, environmental sustainability, corporate governance and their applications to environmental sciences. Students would be encouraged to go beyond the classroom and conduct active action-research, research projects, technology based learning and internships in industry/ private/government/manufacturing and service sectors based on suitability. Lectures and classroom sessions are accompanied with on-field visits, industrial visits, seminars, laboratory experiments and in-plant training. Educational visits are an integral part of teaching Environmental Science. These interventions are compulsory and essential aspects of the curriculum. There are optional subject that can be chosen by the students as per their desire and their professional choices. It is hoped that a student with a four years B.Sc. Environmental Science degree, after having the rigor of the courses outlined here, will feel adequately equipped to meet the challenges of career development. At the same time, there is sufficient content for those who wish to continue academic life at the University beyond the under-



graduate level. Due care has been taken to maintain necessary academic wholesomeness and depth in the course content so that the learning outcomes from these courses will lead to intellectual growth of a student. The need for a Basic course in Environmental Sciences is necessitated by our country's requirement and also the acceptability of the subject by young students from the view point of career opportunity. There is a demand for the subject in our country and as Educationists we have a societal obligation to meet such aspirations of the youths. It is equally expected that Environmental Science graduates will significantly contribute to the vision of 'Zero Defect, Zero Effect' policy initiative of Government of India.



*K. K. Kulkarni*  
Principal  
Modern College of Computer Science & Information Technology  
Aurangabad

## 2. Structure and Curriculum for Bachelor of Science (B. Sc.) Environmental Science (Optional Subject)

(Choice Based Credit System)

**Dr. Babasaheb Ambedkar Marathwada University,  
Aurangabad**

Choice Based Credit System (CBCS)  
Curriculum For  
Faculty of Science and Technology  
Course Structure and Scheme of  
Examination

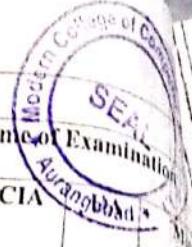


**B.Sc. Three Year Undergraduate Degree Program**

**Semester I**

	Course Code	Course Title	Total periods (Teaching periods/week)	Credits	Scheme of Examination			
					Max Marks	CIA	UA	Min Marks
Optional I (DSC-1A) Core Courses	EVS-111	Core Course (Theory Paper-I) Foundation of Environment	45(3/week)	2	50	10	40	20
	EVS-112	Core Course (Theory Paper-II) Chemical Aspects of Environment	45(3/week)	2	50	10	40	20
	EVS-121	Lab course I (based on EVS-111 and EVS-112)	45(3/week)	1.5	50	10	40	20
Ability Enhancement compulsory courses (AECC-1)	XXX-131	Communication skills in English-I	45(5/week)	3	50	10	40	20
	XXX-132	Marathi/Hindi/Urdu/Sanskrit A student can opt for any one of these languages (SL-I)	45(4/week)	3	50	10	40	20
			225	11.5	250	50	200	100

**Total Credits for Semester I : 11.5 ( Theory : 10 ; Laboratory : 1.5 )**



Semester II							
Course Code	Course Title	Total periods (Teaching periods/week)	Credits	Scheme of Examination			
				Max Marks	CIA	UA	Min Marks
Optional I (DSC-1B) Core Courses	EVS-211	Core Course (Theory Paper-III) Natural Resources Management	45(3/week)	2	50	10	40
	EVS - 212	Core Course (Theory Paper-IV) Solid waste and Hazardous waste management	45(3/week)	2	50	10	40
	EVS -221	Lab course II (based on EVS - 211 and EVS -212)	45(3/week)	1.5	50	10	40
Ability Enhancement compulsory courses (AECC-2)	XXX -231	Communication skills in English-II	45(5/week)	3	50	10	40
	XXX-232	Marathi/Hindi/Urdu/Sanskrit A student can opt for any one of these languages ( SL-II)	45(4/week)	3	50	10	40
Non-Credit Course	XXX-213	Constitution of India	45(3/week)	2*	50		
Non-Credit Course /additional credits	XXX-214	Compulsory Computer Course	45(3/week)	2*	50		
			225	11.5	250	50	200

Total Credits for Semester II : 11.5 ( Theory : 10 ; Laboratory : 1.5)

Semester III							
Course Code	Course Title	Total periods (Teaching periods/week)	Credits	Scheme of Examination			
				Max Mark	CIA	UA	Min Marks
Optional I (DSC-1C) Core Courses	EVS -311		45(3/week)	2	50	10	40
	EVS - 312	Lab course 3 (based on EVS -311)	45(3/week)	2	50	10	40
	EVS -321	Lab course 4 (based on EVS -312)	45(3/week)	1.5	50	10	40
Skill Enhancement course (SEC-1)	XXX-313	SEC-1 Any one skill to be chosen out of two SEC-1(A), SEC-1 (B)	45(3/week)	2	50	10	40
	XXX-331	Communication skills in English-III	45(5/week)	3	50	10	40
Ability Enhancement compulsory courses (AECC-3)	XXX-332	Marathi/Hindi/Urdu/Sanskrit A student can opt for any one of these languages ( SL-III)	45(4/week)	3	50	10	40
			315	15	350	70	280

Total Credits for Semester III : 15 ( Theory : 12 ; Laboratory : 3)

*K. Jagdishwar*  
 VC Principal  
 Modern College of Computer Science & I.T.  
 Aurangabad



Semester IV

	Course Code	Course Title	Total periods (Teaching periods/week)	Credits	Scheme of Examination			
					Max Marks	CIA	UA	Min Marks
Optional I (DSE-1D) Core Courses	EVS-411		45(3/week)	2	50	10	40	20
	EVS-412		45(3/week)	2	50	10	40	20
	EVS-421	Lab course 4 (based on EVS-411)	45(3/week)	1.5	50	10	40	20
	EVS-422	Lab course 5 (based on EVS-412)	45(3/week)	1.5	50	10	40	20
	XXX-413	SEC-2 Any one skill to be chosen out of two SEC-2(C), SEC-2(D)	45(3/week)	2	50	10	40	20
Skill Enhancement course (SEC-2)	XXX-431	Communication skills in English-IV	45(5/week)	3	50	10	40	20
	XXX-432	Marathi/Hindi/Urdu/Sanskrit A student can opt for any one of these languages (SI-IV)	45(4/week)	3	50	10	40	20
Ability Enhancement compulsory courses (NECC-4)		Environmental Studies	45(3/week)	2*	50	10	40	20
			315	15	350	70	220	140

Total Credits for Semester IV : 15 ( Theory : 12 ; Laboratory : 3 )

Semester V

	Course Code	Course Title	Total periods (Teaching periods/week)	Credits	Scheme of Examination			
					Max Marks	CIA	UA	Min Marks
Optional I (DSE-1A) Discipline Specific Elective	EVS-511		45(3/week)	2	50	10	40	20
	EVS-512		45(3/week)	2	50	10	40	20
	EVS-521	Lab course 6 (based on EVS-511)	45(3/week)	1.5	50	10	40	20
	EVS-522	Lab course 7 (based on EVS-512)	45(3/week)	1.5	50	10	40	20
	XXX-513	SEC-3 Any one skill to be chosen out of two SEC-3(E), SEC-3(F)	45(3/week)	2	50	10	40	20
Skill Enhancement course (SEC-3)			225	9	250	50	200	100

Total Credits for Semester V : 9 ( Theory : 06 ; Laboratory : 03 )

Modern College of Computer Science & I.T., Aurangabad

Kwaghmare  
I/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



Semester VI							
	Course Code	Course Title	Total periods (Teaching periods/week)	Credits	Scheme of Examination		
					Max Marks	CIA	UA
Optional I (DSE-1 B) Discipline Specific Elective	EVS-611		45(3/week)	2	50	10	40
	EVS-612		45(3/week)	2	50	10	40
	EVS-621	Lab course 8 (based on EVS-611 )	45(3/week)	1.5	50	10	40
	EVS-622	Lab course 9 (based on EVS-612 )	45(3/week)	1.5	50	10	40
Skill Enhancement course (SEC-4)	XXX-613	SEC-4 Any one skill to be chosen out of two SEC-4(G), SEC-4 (H)	45(3/week)	2	50	10	40
			225	9	250	50	200

Total Credits for Semester V : 09 ( Theory : 06 ; Laboratory : 3 )

Total Credits for three years : Sem I ( 11.5 ) + Sem II ( 11.5 ) + Sem III ( 15 ) + Sem IV ( 15 ) + Sem V ( 09 ) + Sem VI ( 09 ) = 71 Credits

3. Vision
4. Mission
5. Program Educational Objectives:
6. Programme Outcomes (POs) and Programme Specific Outcomes:
7. Eligibility:
8. Duration
9. Medium of Instructions
10. Choice Based Credit System (CBCS) and Credit-to-contact hour Mapping:
11. Attendance:
12. Evaluation Methods/ Scheme of Examination, Earning Credits, Grading System
13. Curriculum for Semester I
14. Curriculum for Semester II
15. Curriculum for Semester III
16. Curriculum for Semester IV
17. Curriculum for Semester V
18. Curriculum for Semester VI

*K. S. Kulkarni*  
Principal  
Modern College of Computer Science & I.T.  
Aurangabad.





## Template for the designing curriculum of various courses/ papers

Course Code and Course Title

Total Credits: 02

Contact Hours: 30 (Clock Hours)

Marks: 50

Periods: 45 (50 minutes each)

Learning Objectives of the Course

Learning Outcomes of the Course

Unit I : 10 Periods

Unit II: 10 Periods

Unit III: 10 Periods

Unit IV : 10 Periods

Unit V: Tutorials, seminars and Assignments (05 Periods)

References:

Important Notes:

- i) **Nomenclature:** DSC- Discipline Specific Core course, SEC – Skill Enhancement Course, AECC- Ability Enhancement compulsory course, DSE- Discipline Specific Elective, UA- University Assessment ( Semester End), CIA-Continuous Internal Assessment
- ii) **There shall be one skill enhancement course (SEC) III<sup>rd</sup> to VI<sup>th</sup> Semester (any one SEC course to be chosen (any one from three optional subjects) from the basket of SEC courses for the respective semester.**
- iii) **Code description:** EVS code has to be decided by BOS of the respective subject while designing their respective curriculum ( e.g. for Environmental Science it will be EVS)

- The codes for first semester courses will start from EVS-111, Second-semester courses will start from EVS-211 and so on
  - EVS111 : The first digit indicate the Semester Number, the second two digits indicate papernumbers for the first-semester courses and the same analogy is for the remaining semesters
  - The codes for theory courses will start from EVS -111 ( for the first semester and the sameanalogy is for the remaining semesters)
  - The codes for practical courses will start from EVS -121 ( for the first semester and the sameanalogy is for the remaining semesters)
  - The codes for Ability Enhancement compulsory courses will start from EVS -131 ( for the firstsemester and the same analogy is for the remaining semesters)
- iv) **Assessment:** 80% for University Assessment ( Semester End Examination) and 20 % for Continuous Internal Assessment ( CIA)
- v) **Continuous Internal Assessment (CIA): Theory (10 Marks):** Internal Test 05 Marks (Two Internal Tests of 05 marks each and average of the two test will be considered) and 05 Marks for Assignment/tutorials.
- vi) **Continuous Internal Assessment ( CIA): Practical (10 Marks):** 07 Marks for Internal Practical Examination and 03 Marks for record book/submission of collection and field survey report and excursion report
- vii) **Practical examination :** Annual examination





Course Objectives

Students will be able to know

1. Dynamics of ecosystems, energy flow in ecological system, nature of a biotic and abiotic components and stability concept of ecosystem.
2. Various types of degraded ecosystems, ecological succession, concept of climax and role of pioneer's species in restoration of ecosystems.
3. Population dynamics, prey predator relationship, concept of community, community competition and ecological sustainability.
4. Nature and status of renewable and non-renewable resources, mineral resources, fishery resources, energy resources and recycle, reuse and recovery of these resources.

**Unit-I: - Ecosystem Dynamics:**

(10)

Concept of ecosystem, Abiotic and biotic components, Energy in ecological system, Concept of productivity, Energy flow in ecosystem, Food chain, Food web, Ecological pyramids, Biogeochemical cycles of nitrogen, oxygen and carbon.

**Unit-II: Ecological succession**

(10)

Types of ecological succession, Mechanism of succession, Concept of climax, Concept of Gaia hypothesis, Concept of habitat, Ecological niche, Guild, concept of ecotone, Edge effect, Significance of ecological adaptation, Ecological adaptation in plant- Hydrophytes, Xerophytes, Mesophytes and Halophytes.

**Unit-III:-Restoration of Degraded Ecosystems:**

(10)

Degraded ecosystems such as, Forest, grassland, Desert ecosystem, Lentic and Lotic ecosystems, Coastal ecosystems, etc., Role of pioneer species in restoration, Major biomes of world.

**Unit-IV: - Population and Community Ecology:**

(10)

Concept of population ecology, Population dynamics, Characteristics of population: Natality, Mortality, Fecundity, Density, Age distribution, Prey predator Relationship, Population explosion: Concept of community, Interspecific and intraspecific competition, Concept of carrying capacity.

**Unit-V: Tutorials, seminars and Assignments**

(05)

## Course Outcome



Students should be able to:

1. Define ecological systems and its functionality along with stability of ecosystem
2. Describe various types of pioneer species and their role in restoration of ecosystems.
3. Recognize ecological succession, concept of climax and degraded ecosystem.
4. Examine nature and status of renewable and non renewable energy resources, mineral resources and energy resources.

### References

1. Fundamentals of Ecology – E.P. Odum, Revised Edition 1995-96
2. Principles of Ecology – P.S. Verma, V.K. Agarwal, S. Chand and Co. Delhi.
3. Principles of Environmental Science – Wart K.E.F. (1973) McGraw Hill Book Company.
4. Basic Ecology – E.P. Odum
5. Concept of Ecology – E.J. Koromondy, 1996, concept of modern biology series, prentice Hall.
6. Modern Concepts of Ecology – H.D. Kumar
7. Principles of Environmental Biology – P.K.G. Nair, Himalaya pub. House, Delhi
8. Environmental Biology – P.D. Sharma, Rastogi Publication, Meerut.
9. Ecology and Environment - P.D. Sharma, Rastogi Publication, Meerut.
10. Basic concepts of soil science – A.K. Kolay, Willey estern ltd., New Delhi.
11. Environmental Science – Enger, Smith, Smith, W.M.C. Brown company publishing
12. Practical Method in Ecology – R.K. Trivedi, P.K. Goel and Trisal., Enviro Publication, Karad.
13. Chemical methods for Environmental Analysis Water and sediments – R.Ramesh, M. Anbu. Macmillan India Ltd. New Delhi.
14. Fundamental of Ecology – Dash M.C. Tata McGraw Hill Pub. Co. Ltd. NewDelhi.
15. Concepts of Ecology (Fourth Edition)- Edward J. Kormondy, Prentice Hall of India Pvt. Ltd. New Delhi.
16. Environment forest, ecology and man – Dixit R.K. Rastogi Publication, NewDelhi.
17. Environment, energy, health planning for conservation – V. Vidyath, Gyan Publishing House, New Delhi
18. Air pollution-M.N. Rao
19. Air pollution- A.C. Stern, Academic press Vol. I-X.
20. Air pollution-V.P. Kudesia.
21. Air pollution control-NEERI
22. Air pollution-Magill Holder and Ackely
23. Water pollution-A.K. Tripathi and S.N. Pande
24. Waste water engineering, treatment, disposal and reuse-Metcalf and Eddy.
25. water supply and sanitary engineering-R.C. Rangwala

B. Sc. I Year Semester I  
Core Course (Theory Paper-II)  
EVS-112: Chemical Aspect of Environment



Course Objectives

Students will be able to know

1. Understand the basics concepts of Chemistry
2. Acquire the knowledge of composition of Air, Water & Soil
3. Identify the chemical aspects of Environment.
4. To analyze processes for Air, Water & Soil

(10)

**Unit-I: -Basic Concepts of Environmental Chemistry:**

Energy-definition, types (kinetic and potential), Forms of energy: Laws of thermodynamics (First & Second), Stoichiometry, Gibbs energy, Chemical potential, chemical equilibrium, Acid-base reactions, Solubility product, Solubility of gases in water.

(10)

**Unit-II: - Chemical Agents in Environment:**

Introduction, definition, Scope, Importance . Role of chemical agents in environment, Basic water chemistry, Impurities, Basic principles and sources, Gases solubility in water, Heat influencing chemical reactions, Solubility of impurities, Characteristics of sanitary spent water, Concentration, Normality, Molarity, concept of dilution , Serial dilution, Single step and multiple step dilution, Sample collection guidelines, Sample preservation , Sample order.

(10)

**Unit-III: Chemistry of Air :**

Classification of elements, Composition of air, Chemical speciation, particles, ions and radicals in the atmosphere, Chemical processes for formation of inorganic and organic particulate matter, Toxic chemicals in environment, Pesticides, Insecticides, Arsenic, Cadmium, Lead, Mercury, Carbon monoxide and Ozone, MIC and other carcinogens in air and water, Chemistry of Ozone layer, Ozone layer depletion, Causes and effects. Greenhouse effect: Major greenhouse gases, Causes and effects. Global Warming, Causes and effects.

(10)

**Unit-IV: - Chemistry of Water and Soil:**

Chemistry of water, Structure of water molecule, Solubility of compounds in water, Dissociating constant, Water quality parameters and standards, Chemistry of soil, Composition of soil, Biogeochemical cycles (nitrogen, oxygen, carbon, Sulphur, phosphorus etc.), Micronutrients of soil, Factors effecting the soil quality, Adsorption of contaminant in soil, Toxic chemicals present in soil.

**Unit V: Tutorials, seminars and Assignments**



### Course Outcome

Students should be able to:

- Define basic aspects of environment
- Explain chemical contamination in the environment
- Apply the knowledge of chemistry to analyze air, water and soil quality
- Evaluate the level of pollution in environment

### References

1. Environmental Chemistry- G.S. Sodhi.
2. Environmental Science –S.C.Santra
3. Environmental Chemistry- S. E.Mannhan
4. Environmental Chemistry – A.K. De
5. Environmental Chemistry-A global perspective; G.W. Vantoon and S.J. Duffy, Oxford Uni. Press, London.
6. Environmental chemistry – B.K. Sharma
7. Environmental chemistry – B.K. Sharma and H. Kaur
8. Environmental pollution analysis – S.M. Khopkar
9. Environmental chemical analysis – Lanin L. Marr, Malcom S.
10. Environmental Chemistry – Kanan Krishnan.
11. Environmental Chemistry – S.K. Banerjee.
12. Environmental Chemistry – J.W. Moore and E.A. Moore.
13. Destruction of hazardous chemicals in the laboratory: G. Lunn and E.B. Sansone.
14. A text book of Environmental Chemistry and pollution control – S.S. Dara.
15. Environmental Chemistry – M. Satake, Do. S. Sethi, S.A. Eqbal.
16. Environmental and Man: The chemical environment: J. Lenihan and W.W. Fletcher.
17. Environmental Chemistry – S.S.Dara

B. Sc. I Year Semester I  
EVS-121: Lab Course- I  
(Practical paper based on paper EVS-111 and EVS-112)



1. To study the 'Laboratory Safety Rules'.
2. To study the cleaning methods of glass wares.
3. To study the First-Aid and emergency treatment in laboratory.
4. Collection and Preservation of phytoplankton and zooplankton samples from different Water bodies (river, pond, Lake etc)
5. The qualitative study the phytoplankton's (any 10 specimens).
6. The qualitative study the zooplanktons (any 10 specimens).
8. Collection of hydrophytes, xerophytes, mesophytic and halophytic plants / animals Specimens.
9. Study of xeric adaptation in plants, morphometrically and histologically.
10. Study of xeric adaptations in animal (at least 5 specimen's morphometrically)
11. Study of mesophytic specimens (at least 5 specimens).
12. To study the laboratory equipments and instruments (Oven, Microscope, Incubator, Inoculation chamber, Autoclave, Electronic balance, pH meter, Colorimeter, Turbidity meter, etc).
13. To study the preparation of reagents of different Normality and Molarities (i.e. 1 N, 0.1N, 1M, etc).
14. Study of various equipments used in air pollution.
15. Detection of SO<sub>2</sub> gas and its effect on plants.
16. Detection of NH<sub>3</sub> gas and its effect on plants.

Note:

- i) Duration for each practical is of 04 periods.
- ii) Study tour /field visits are compulsory.

Principal  
Modern College of Computer Science & I.T.  
Aurangabad

Kisaghmare  
HC Principal  
Modern College of Computer Science & I.T.  
Aurangabad.

UNIVERSITY  
Modern College of Computer Science & I.T.  
Aurangabad  
SEAL  
2023.  
n of  
ted  
&  
v

**B. Sc. I Year Semester II**  
**Core Course (Theory Paper-III)**  
**EVS- 211: Natural Resources Management**



**Unit I: Natural Resources:**

Definition; Classification; Concept of renewable and nonrenewable resources; their conservation and importance, Role of Individuals and NGOs in Resource Conservation; Environmental movements such as 'Chipko', Western Ghats, and Silent valley, Narmada, Project agitation etc.; Role of individuals and NGO's in natural resource conservation.

**Unit II: Energy Resources:** (10)

Renewable and non-conventional energy resources like solar, wind, geothermal, tidal and wave energy, biomass, biogas and biodiesel, hydroelectric energy; Atomic energy, on-renewable and conventional energy resources like coal, petroleum, fuel gases; Environmental impacts of energy exploitation, Energy conservation.

**Unit IV: Forest and Wildlife Resources:** (12)

Importance of forests and wildlife; Types of forest resources; Overexploitation of forests; Deforestation; Forest management and conservation; Wildlife conservation; National parks and sanctuaries; Biosphere reserves.

**Unit IV: a) Water Resources and conservation:** (10)

Water resources on the earth; Consumption and uses of water; Management and conservation of water resources; Rain water harvesting, drip irrigation.

**b) Mineral and Soil Resources:**

Types and Importance of minerals and soil; Important minerals of India; Mineral extraction and environmental problems; Conservation of mineral resources; Reclamation of mining areas. Soil erosion, conservation of soil.

**Unit V: Tutorials, seminars and Assignments** (05)

*L. K. Mahare*  
HC Principal  
Modern College of Computer Science & I.T.  
Aurangabad.





## References:

1. Environmental Chemistry – B.K.Sharma
2. Ecology and Environment – P.D Sharma
3. Geography of India – Majid Hussain
4. Environmental Studies- Arun K.Tripathi
5. Environmental Geography- Savindra Singh
6. Oceanography- Savindra Singh
7. Environmental studies -Erach Bharucha
8. Environmental studies –Irani Dipti
9. Craig, J.R., Vaughan. D.J. & Skinner. B.J. 1996. Resources of the Earth: Origin, Use, and Environmental Impacts (2nd edition). Prentice Hall, New Jersey.
10. Freeman, A.M. 2001. Measures of value and Resources: Resources for the Future. Washington DC.
11. Freeman, A.M. 2003. Millennium Ecosystem Assessment: Conceptual Framework. Island Press.
12. Ginley, D.S. & Cahen, D. 2011. Fundamentals of Materials for Energy and
13. Environmental Sustainability. Cambridge University Press.
14. Klee, G.A. 1991. Conservation of Natural Resources. Prentice Hall Publication.
15. Miller, T.G. 2012. Environmental Science. Wadsworth Publishing Co.
16. Ramade, F. 1984. Ecology of Natural Resources. John Wiley & Sons Ltd.
17. Tiwari, G.N. & Ghosal. M. K. 2005. Renewable Energy Resources: Basic Principles and Application. Narosa Publishing House.



*K. V. Ghosh*  
IIC Principal  
Modern College of Computer Science & I.T.  
Aurangabad



**Unit I- Introduction**

(10)

Introduction to MSW, Composition and Waste characteristics of MSW, Collection, Segregation and Transfer Operation, Waste system, current scenario, MSW generation in India, Model for appropriate waste collection and segregation, reference model, mode of collection, micro-route planning and maps, transfer stations, Management and Handling Rules of MSW.

**Unit II- Treatment Method for MSW**

(10)

1. Anaerobic Digestion, 2. Aerobic Digestion, 3. Vermicomposting, 4. Incineration, 4) Mass Burn and Refuse-Derived Fuel, 5. Waste To Energy (WTE), Dioxin and furans, heavy metals, 6. Landfill (Basic Landfill Constructions and operations, Decomposition and phases in Landfill) Types landfills (Secured Landfill, Sanitary Landfill).

**Unit III- Integrated Solid Waste Management**

(10)

Source Reduction, Green, Material Selection, Product System Life Extension, Material Life Extension, Reduced Material Intensiveness, Process Management, Efficient Distribution, Eco-labels, Lifecycle Assessment, The 5 R's-Reduce, Recycle (Paper & Paperboard, Plastics, Glass Containers, Aluminum), Reuse, Remanufacture, Recover (Energy Recovery & Material Recovery)

**Unit- IV- Hazardous waste Sources and Management**

(10)

Hazardous Waste Management: Definition and identification of hazardous wastes- sources and characteristics – hazardous wastes in Municipal Waste – Hazardous waste regulations –minimization of Hazardous Waste-compatibility, handling and storage of hazardous waste-collection and transport, e- waste -sources, collection, treatment and reuse management. Hazardous waste treatment: Hazardous waste treatment technologies, Biomedical Waste management: Biomedical (Handling and Management) Rules 2008, sources and disposal.

**Unit-V- Tutorials, seminars and Assignments**

(05)

## References



1. George Tchobanoglous et al., "Integrated Solid Waste Management", McGraw-Hill Publishers, 1993, 177
2. B. Bilitewski, G. HardHe, K. Marek, A. Weissbach, and H. Boeddicker, "Waste Management", Springer, 1994.
3. Municipal Solid Waste Management - N. N. Bandola, D.G. Tare, B.R. Publishing Corporation, 2009
4. Manual on Municipal Solid Waste Management, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2000
5. R.E. Landroth and P.A. Rebers, "Municipal Solid Wastes - problems and Solutions", Lewis Publishers, 1997.
6. Bhide A.D. and Sundaresan, B.B., "Solid Waste Management in Developing Countries", INSIDOC, 1993.
7. George Tchobanoglous et al., "Integrated Solid Waste Management", McGraw-Hill Publishers, 1993, 177
8. B. Bilitewski, G. HardHe, K. Marek, A. Weissbach, and H. Boeddicker, "Waste Management", Springer, 1994.
9. Manual on Municipal Solid Waste Management, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2000
10. R.E. Landroth and P.A. Rebers, "Municipal Solid Wastes - problems and Solutions", Lewis Publishers, 1997.
11. Bhide A.D. and Sundaresan, B.B., "Solid Waste Management in Developing Countries", INSIDOC, 1993.
12. Gilbert Masters, "An Introduction of Environmental Engineering", McGraw-Hill Publishers.
13. Dr. P.K. Behera, Dr. S.K. Sahu and M.S. Shivarama, "Encyclopedia of Hazardous Waste Management", Dominant Publishers and Distributors.

*K. S. Kulkarni*

Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

**DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY,  
AURANGABAD.**



**Circular /Acad Sec./Curriculum-12(7)/HF/CBCS-BA-II Yr/ 01/2023.**

It is hereby inform to all concerned that, on the recommendation of Dean, Faculty of Humanities; **the Hon'ble Vice-Chancellor has accepted the following subject wise Curriculum of Choice Based Credit & Grading System** under the faculty of Humanities in his emergency powers under Section 12 [7] of the Maharashtra Public University Act, 2016 on behalf of the Academic Council.

Sr. No.	UG Subject wise Curriculum	Semesters
✓01.	B. A./B.Com/ B.Sc./BFA/BSW Second Language & Optional Second Year [Marathi]	IIIrd & IVth
02.	B. A./B.Com/ B.Sc./BFA/BSW Second Language & Optional Second Year [Hindi]	IIIrd & IVth
03.	B. A./B.Com/ B.Sc./BFA/BSW Second Language & Optional Second Year [Urdu]	IIIrd & IVth
04.	B.A./ B.Com/ B.Sc. Second Language & Optional Second Year [Sanskrit]	IIIrd & IVth
05.	B. A. Second Year [Political Science]	IIIrd & IVth
06.	B. A. Second Year with Model College [Economics]	IIIrd & IVth
07.	B. A. Second Year [History]	IIIrd & IVth
08.	B. A. Second Year for Model College [Sociology]	IIIrd & IVth
09.	B. A. Second Year [Public Administration]	IIIrd & IVth
10.	B. A. Second Year [Military Science]	IIIrd & IVth
11.	B. A. Second Year [Philosophy]	IIIrd & IVth
12.	B.A./ B.Com/ B.Sc. Second Year Optional [National Cadet Corps (NCC)]	IIIrd & IVth

**This is effective from the Academic Year 2023-24 and Onwards as per appended herewith.**

All concerned are requested to note the contents of this circular and bring notice to the students, teachers and staff for their information and necessary action.

University campus,  
Aurangabad 431 004.  
Ref. No. SU/Col. /UG/CBCS/ B.A.  
II Yr/FH/ 2023/ 363)-51

Date: 03.07.2023.

\*\*\*\*\*

**Deputy Registrar,  
Academic.**

**IC Principal**

**Modern College of Computer Science & I.T.,  
Aurangabad.**

--2--

**Copy forwarded with compliments to:-**

- 1] **The Principal, all affiliated colleges,**  
Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.
- 2] **The Principal, Model college,**  
Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.
- 3] **The Director, University Network & Information Centre, UNIC,**  
with a request to upload this Circular on University Website.

**Copy to :-**

- 1] **The Director, Board of Examinations & Evaluation,**
- 2] **The Section Officer, [B.A., B.Com, B.Sc. Unit] Exam. Branch,**
- 3] **The Section Officer, [Eligibility Unit],**
- 4] **The Programmer [Computer Unit-1] Examinations,**
- 5] **The Programmer [Computer Unit-2] Examinations,**
- 6] **The In-charge, [E-Suvidha Kendra],**
- 7] **The Public Relation Officer,**
- 8] **The Record Keeper,**  
Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.

-\*\*\*-

DrK\*030723/-



*Kwaghmare*  
Principal

Modern College of Computer Science & I.T.,  
Aurangabad.



**DR. BABASAHEB AMBEDKAR  
MARATHWADA UNIVERSITY,  
AURANGABAD.**



Curriculum of

**B. A./ B.Com./ B.Sc./ B.F.A./ B.S.W.**

**Second Year (S.L. & Opt.)**

**[Marathi]**

**Semester-III & IV**

**'under Choice Based Credit & Grading System Pattern'**

**Implemented at College**

**Level**

**[ Effective from the Academic Year 2023-24 & Onwards]**

*Kwaghman*

I/C Principal

Modern College of Computer Science & I.T.  
Aurangabad.



डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद.

बी.ए./बी.एससी., द्वितीय वर्ष, सत्र-तिसरे

CBCS पद्धतीनुसार जून २०२३ पासून लागू

अभ्यासपत्रिका ३ री - भारतीय भाषा : मराठी (भाग-३ रा)

संकेतांक - AECC-3 Marathi

श्रेयांक - ०३ गुण-५० (लेखी परीक्षा-४०, प्रात्यक्षिक-१०)

तासिका-५७

तास-४५

उद्दिष्टे :

- विद्यार्थ्यांच्या मनात निवडक वेच्याच्या परिशीलनाने मूल्यात्मक वाढ होईल.
- रसास्वाद क्षमता वाढीस लागेल.
- विवेकवादाची व वैज्ञानिक दृष्टिकोनाची काम धरण्यास मदत होईल.
- लेखनातील विविध प्रवृत्ती व प्रकृती समजण्यास मदत होईल.
- सृजनशील लेखनाकरिता उद्युक्त करण्यास मदत होईल.

अ.क्र.	घटक	अभ्यासक्रमाचा तपशील	श्रेयांक	तास
१	गद्य विभाग	१. हमा आणि लड्डू म्हा - निर्मलकुमार फडकुले २. बहुजन सभाकाचे शिक्षण - धा.स. भोळे ३. ऐसे जयाने पाईक बळिया - किशोर भाग्य ४. रमाई - यशवंत मनोहर ५. निरोप - राजकुमार तांगडे ६. काकागचोळी - अनिता कलकटे	१	१५
२	पद्य विभाग	१. सागरास - रमातन्वजी वि.रा. भाकरकर २. कुणाच्या खाद्याकर - आरती इंग्ले ३. आवाहन - दत्ता हलसणीकर ४. महानुरूप ! - हिरा कलसोडे ५. बियाण - जागनाथ पाटील ६. मराठी माती - वा.वा. आंधळे ७. पिंपळखोपा - निशिकांत आरवटे ८. सुगंधी बाग आहे ती - शेख आबिद ९. झोप - उर्मिला धाकूरकर १०. अतिक्रमण - विशाल इंगोले ११. बिरसाईला - सखाराम डाखोरे १२. आळवण - विकास जगतप	१	१५
३	उपयोजित मराठी	१. मृतसंकलन व निवेदन २. चॅटजीपीटी ३. सदर लेखन ४. सारांश लेखन	०.५	०८
४	प्रकल्प	संबंधित प्राध्यापकांनी विद्यार्थ्यांकडून विषयानुसृत प्रकल्प पूर्ण करून घ्यावेत.	०.५	०७

Kwaghman

IC Principal  
Modern College of Computer Science & IT  
(औरंगाबाद)  
अध्यक्ष, मराठी अभ्यास केंद्र



डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद.

बी.कॉम, बी.एस.डब्ल्यू., बी.एफ.ए., द्वितीय वर्ष, सत्र-तिसरे

CBCS पद्धतीनुसार जून २०२३ पासून लागू

अभ्यासपत्रिका ३ री - भारतीय भाषा : मराठी (भाग-३ रा)

संकेतांक - AECC-3 Marathi

तासिका-५७ तास-४५ श्रेयांक - ०३ गुण-१०० (लेखी परीक्षा-८०, प्रात्यक्षिक-२०)

उद्दिष्टे

१. विद्यार्थ्यांच्या मनात निवडक वेच्याच्या परिशीलनाने मूल्यात्मक वाढ होईल.
२. रसास्वाद क्षमता वाढीस लागेल.
३. विवेकवादाची व वैज्ञानिक दृष्टिकोनाची कास धरण्यास मदत होईल.
४. लेखनातील विविध प्रवृत्ती व प्रकृती समजण्यास मदत होईल.
५. सूत्रनशील लेखनाकारिता उद्युक्त करण्यास मदत होईल.

अ.क्र	घटक	अभ्यासक्रमाचा तपशील	श्रेयांक	तास
१	गद्य विभाग	१. हसा आणि लड्डू व्हा - निर्मलकुमार फडकुले २. बहुजन समाजाचे शिक्षण - भा.ल. भोळे ३. ऐसे जयाचे पाईक बळिया - विशोर सानप ४. रमाई - यशवंत मनोहर ५. निरोप - राजकुमार तांगडे ६. काकणचोळी - अनिता यलमते	१	१५
२	पद्य विभाग	१. सागरास - स्वातंत्र्यवीर वि.दा. सावरकर २. कुणाच्या खांद्यावर - आरती प्रभू ३. आवाहन - दत्ता हलसगीकर ४. महापुरूषा ! - हिरा वनसोडे ५. बियाणं - नागनाथ पाटील ६. मराठी माती - वा.ना. आंधळे ७. पिंपळखोपा - निशिकांत आलते ८. सुगंधी बाग आहे ती - शेख आविद ९. झेप - उर्मिला चाकूरकर १०. अतिक्रमण - विशाल इंगोले ११. बिरसाईता - सखाराम डाखोरे १२. आळवण - विकास जगताप	१	१५
३	उपयोजित मराठी	१. वृत्तसंकलन व निवेदन २. चॅटजीपीटी ३. सदर लेखन ४. सारांश लेखन ५. जनसंपर्काची साधने व महत्त्व ६. कार्यालयीन व्यवहार	०.५	०८
४	प्रकल्प	संबंधित प्राध्यापकांनी विद्यार्थ्यांकडून विषयानुकूल प्रकल्प पूर्ण करून घ्यावेत.	०.५	०७

Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.  
(सर्जराव जिग)  
अध्यक्ष, मराठी अभ्यास केंद्र,





डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद.

बी.ए. द्वितीय वर्ष, सत्र - तिसरे

CBCS पद्धतीनुसार जून २०२३ पासून लागू

मराठी (ऐच्छिक) - अभ्यासपत्रिका ५ वी

मध्ययुगीन मराठी वाङ्मयाचा इतिहास : आरंभ ते १५९९

संकेतांक - CC-2C(5) Marathi

तासिका-५७

तास-४५

श्रेयांक - ०३

गुण-५०

(लेखी परीक्षा-४०, प्रात्यक्षिक-१०)

उद्दिष्टे :

१. मराठी वाङ्मयाचा प्रारंभकाल समजून घेण्यास मदत करणे.
२. मध्ययुगातील प्रारंभीची कविता व गद्य वाङ्मय लक्षात आणून देणे.
३. मध्ययुगातील महत्त्वाचे संप्रदाय व काही प्रवाह त्यांच्या प्रकृतीसह लक्षात घेण्यास मदत करणे.
४. मध्ययुगातील सामाजिक व राजकीय परिस्थिती समजून घेण्यास मदत होईल.
५. मध्ययुगातील विविध प्रकारच्या लेखनापाठीमागील प्रेरणा समजून घेण्यास मदत होईल.

अ.क्र	घटक	अभ्यासक्रमाचा तपशील	श्रेयांक	तास
१	प्रारंभकाल व आद्यकवी मुकुंदराज	१. महाराष्ट्रनामाभिधान उपपत्ती २. मराठी भाषेची पूर्वपीठिका ३. आद्यकवी मुकुंदराज व त्यांची ग्रंथसंपदा	०.५	०६
२	महानुभाव संप्रदाय व त्यांचे साहित्य	१. महानुभावपंथाचे तत्त्वज्ञान २. सर्वज्ञ चक्रधर व समकालीन महाराष्ट्र ३. महानुभावांचा आचारधर्म ४. महानुभावांचे गद्य वाङ्मय ५. महानुभावीय पद्य रचना	१	१५
३	वारकरी संप्रदाय व संत साहित्य	१. संत ज्ञानदेव व संत नामदेव २. संत नामदेवांची प्रभावळ ३. संत नाथपूर्वकालीन कान्होपात्रा व दासोपंत ४. संत एकनाथ व त्यांचा वाङ्मयीन आविष्कार ५. नाथ समकालीन काही महत्त्वपूर्ण कवी (त्र्यंबकराज, शिवकल्याण, रमावल्लभदास, विष्णुदासनामा, कृष्णदास मूद्गल) ६. जैन, वीरशैव, ख्रिस्ती व मुस्लिम धर्मीय कवींच्या रचना ७. संत तुकाराम	१	१५
४	प्रकल्प	मध्ययुगीन संतांची व महानुभावपंथांच्यांची चरित्रे संकलित करणे, मध्ययुगीन कलाकृतींचे परीक्षण, दोन संप्रदायातील तुलना, महाविद्यालयातील प्राध्यापकांनी विषयानुरूप अन्य विषय येथे प्रकल्प लेखनासाठी देणे अभिप्रेत आहे.	०.५	०७

संदर्भ ग्रंथ :

१. ढेरे रा. चिं. - प्राचीन मराठीच्या नवधारा - मोठे प्रकाशन, कोल्हापूर
२. देशपांडे अ.ना. - प्राचीन मराठी वाङ्मयाचा इतिहास, व्हीनस प्रकाशन, पुणे
३. नसिराबादकर ल.रा. - प्राचीन मराठी वाङ्मयाचा इतिहास, फडके प्रकाशन, कोल्हापूर
४. प्रा. सुप्राम पुल्ले - महानुभाव आणि वारकरी साहित्याचे अंतरंग, इसाप प्रकाशन, नांदेड
५. भावे वि.ल. - महाराष्ट्र सारस्वत, पॉप्युलर प्रकाशन, मुंबई

IIC Principal

Modern College of Computer Science & I.T.

Aurangabad.

(संजय जिगे)

मध्ययुगीन मराठी अभ्यासपत्रिका

Kwajim





डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद.

बी.ए. द्वितीय वर्ष, सत्र - तिसरे

CBCS पद्धतीनुसार जून २०२३ पासून लागू

मराठी (ऐच्छिक) - अभ्यासपत्रिका ६ वी

साहित्य प्रकार : कादंबरी

संकेतांक - CC-2C(6) Marathi

तासिका-५७ तास-४५ श्रेयांक - ०३ गुण-५० (लेखी परीक्षा-४०, प्रात्यक्षिक-१०)



दृष्टे :

- कादंबरीचे स्वरूप व घटक सांगता येतील.
- कादंबरीचे विविध प्रकार उलगाडून दाखविण्यास मदत होईल.
- कादंबरीचे आशयसूत्र व भाषा यातील विविध घटकांचा उलगाडा करता येईल.
- कादंबरीच्या कथानकाची जडण-घडण घटना प्रसंगाच्या आधारे कशी होते ते सांगता येईल.
- कादंबरीतील जाणिवा समजून सांगता येतील.

अ.क्र	घटक	अभ्यासक्रमाचा तपशील	श्रेयांक	तास
१	कादंबरीचे स्वरूप : विशेष	१. अर्थ व व्याख्या २. कादंबरीचे स्वरूप विशेष ३. कादंबरीची परंपरा व प्रकार	०.५	०८
२	रणांगण-विश्राम बेडेकर	१. 'रणांगण'चे कथानक २. महायुद्धाची पार्श्वभूमी व 'रणांगण'मधील संवाद, विरोध, समतोल ३. 'रणांगण'चे वाङ्मयीन मूल्यमापन ४. 'रणांगण'चा भाषिक विचार ५. 'रणांगण' शीर्षकाची अन्वर्थकता	१	१५
३	नदीष्ट - मनोज बोरगावकर	१. 'नदीष्ट' : चेहराविहीन लोकांच्या जगण्याचे दाहक वास्तव २. 'नदीष्ट' मधील मानवतावादी दृष्टिकोन ३. 'नदीष्ट'चे वाङ्मयीन विशेष ४. 'नदीष्ट'चा भाषिक विचार ५. 'नदीष्ट' चा मानसशास्त्रीय विचार	१	१५
४	प्रकल्प	एखाद्या कादंबरीचे परीक्षण, कादंबरीकाराची मुलाखत, संबंधित प्राध्यापकांनी विषयानुरूप विषय देणे अभिप्रेत आहे.	०.५	०७

संदर्भ ग्रंथ :

- नरहर कुबंदकर - धार आणि काठ, देशमुख आणि कंपनी पब्लिशर्स प्रा.लि. पुणे-३०.
- उषा हस्तक - कादंबरी आणि मराठी कादंबरी, साहित्यसेवा प्रकाशन, औरंगाबाद
- चंद्रकांत बांदिवडेकर - मराठी कादंबरी चिंतन आणि समीक्षा, मेहता प्रकाशन, पुणे

Kwaghmare

IC Principal

Modern College of Computer Science & I.T.,  
Aurangabad.

(सजें/१९/जि०)

शिक्षक मराठी/साहित्य/०२६





डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद.

बी.ए./बी.एस्सी., द्वितीय वर्ष, सत्र - चौथे

CBCS पद्धतीनुसार जून २०२३ पासून लागू

अभ्यासपत्रिका ४ थी - भारतीय भाषा : मराठी (भाग-४ था)

संकेतांक - AECC-4 Marathi

तासिका-५७ तास-४५ श्रेयांक - ०३ गुण-५० (लेखी परीक्षा-४०, प्रात्यक्षिक-१०)

उद्दिष्टे :

१. विद्यार्थ्यांच्या ठिकाणी श्रममूल्याची वाढ होईल.
२. सामाजिक संवेदनशीलता वाढीस लागेल.
३. विवेकवादाची व वैज्ञानिक दृष्टिकोनाची कास धरण्यास मदत होईल.
४. लेखनातील विविध प्रवृत्ती व प्रकृती समजण्यास मदत होईल.
५. सृजनशील लेखनाकरिता उद्युक्त करण्यास मदत होईल.

अ.क्र	घटक	अभ्यासक्रमाचा तपशील	श्रेयांक	तास
१	गद्य विभाग	१. श्रमजीविका - विनोबा भावे २. आईचं पत्र - रत्नाकर मतकरी ३. समाजक्रांतीचे उदगाते कबीर, फुले - जी.ए. उगले ४. शब्द - सुधा खराटे ५. केळेवाडी परिसरातील युगपुरूष - मुरहरी केळे ६. आडोसा - लक्ष्मीकमल गेडाम	१	१५
२	पद्य विभाग	१. घेता - विं.दा. करदीकर २. आकाशी झेप घे रे पाखरा - जगदीश खेबुडकर ३. जगत आलो असा - सुरेश भट ४. असे जगावे दुनियेमध्ये - गुरू ठाकूर ५. मी असे कित्येक पाहिलेत अश्वत्थामे - देवकर्ण मदन ६. जमीन - केशव देशमुख ७. वारकरी बाप - विनायक पवार ८. शोधा ज्याचे त्याने - नितीन देशमुख ९. विकृतीची लक्त्रे - धोंडोपंत मानवतकर १०. शृंगार मराठीचा - संगीता कदम-झिजुरके ११. भाडणाचा प्रश्नच कुठं येतो रे ? - डी.के. शेख १२. मला तो परत भेटला - सुदेश इंगळे	१	१५
३	उपयोजित मराठी	१. सगणक व मराठी भाषा २. सृजनात्मक लेखन ३. अप्रलेख ४. पत्रलेखन व टिप्पणी	०.५	०८
४	प्रकल्प	संबंधित प्राध्यापकांनी विद्यार्थ्यांकडून विषयानुसृत प्रकल्प पूर्ण करून घ्यावेत.	०.५	०७

Principal  
Modern College of Computer Science & IT  
Aurangabad.

(सज्जिव जिगे)  
अध्यक्ष, मराठी अभ्यास मंडळ

Principal  
Modern College of Computer Science & IT  
Aurangabad.



डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद.  
बी.कॉम, बी.एस.डब्ल्यू., बी.एफ.ए., द्वितीय वर्ष, सत्र - चौथे

CBCS पद्धतीनुसार जून २०२३ पासून लागू

अभ्यासपत्रिका ४ थी - भारतीय भाषा : मराठी (भाग-४था)

संकेतांक - AECC-4 Marathi

तासिका-५७ तास-४५ श्रेयांक - ०३ गुण-१०० (लेखी परीक्षा-८०, प्रात्यक्षिक-२०)

उद्दिष्टे :

१. विद्यार्थ्यांच्या ठिकाणी श्रममूल्याची वाढ होईल.
२. सामाजिक संवेदनशीलता वाढीस लागेल.
३. विवेकवादाची व वैज्ञानिक दृष्टिकोनाची कास धरण्यास मदत होईल.
४. लेखनातील विविध प्रवृत्ती व प्रकृती समजण्यास मदत होईल.
५. सृजनशील लेखनाकरिता उद्युक्त करण्यास मदत होईल.

अ.क्र	घटक	अभ्यासक्रमाचा तपशील	श्रेयांक	तास	
१	गद्य विभाग	१. श्रमजीविका - विनोबा भावे २. आईचं पत्र - रत्नाकर मतकरी ३. समाजक्रांतीचे उदगाते कबीर, फुले - जी.ए. उगले ४. शब्द - सुधा खराटे ५. केळेवाडी परिसरातील युगपुरुष - मुरहरी केळे ६. आडोसा - लक्ष्मीकमल गेडाम	१	१५	
२	पद्य विभाग	१. घेता - वि.दा. करंदीकर २. आकाशी झेप घे रे पाखरा - जगदीश खेबुडकर ३. जगत आलो असा - सुरेश भट ४. असे जगावे दुनियेमध्ये - गुरू ठाकूर ५. मी असे कित्येक पाहिलेत अश्वत्थामे - देवकर्ण मदन ६. जमीन - केशव देशमुख ७. वारकरी बाप - विनायक पवार ८. शोधा ज्याचे त्याने - नितीन देशमुख ९. विकृतीची लक्त्रे - धोंडोपंत मानवतकर १०. शृंगार मराठीचा - संगीता कदम-झिजुरके ११. भाडणाचा प्रश्नच कुठं येतो रे ? - डी.के. शेख १२. मला तो परत भेटला - सुदेश इंगळे	१	१५	
३	उपयोजित मराठी	१. संगणक व मराठी भाषा ३. अग्रलेख ५. पारिभाषिक शब्द सूची	२. सृजनात्मक लेखन ४. पत्रलेखन व टिप्पणी ६. स्मरणिका संपादन	०.५	०८
४	प्रकल्प	संबंधित प्राध्यापकांनी विद्यार्थ्यांकडून विषयानुकूल प्रकल्प पूर्ण करून घ्यावेत.	०.५	०७	

(स.ज.रा.व.जि.)  
प्रमुख, मराठी अभ्यास मंडळ.  
Modern College of Computer Science & I.T.,  
Aurangabad.



डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद.

बी.ए. द्वितीय वर्ष, सत्र - चौथे

CBCS पद्धतीनुसार जून २०२३ पासून लागू

मराठी (ऐच्छिक) - अभ्यासपत्रिका ७ वी

मध्ययुगीन मराठी वाङ्मयाचा इतिहास : १६०० ते १८१८

संकेतांक - CC-2D(7) Marathi

तासिका-५७

तास-४५

श्रेयांक - ०३

गुण-५०

(लेखी परीक्षा-४०, प्रात्यक्षिक-१०)

उद्दिष्टे :

१. मराठी वाङ्मयाचा शिवकाल, पेशवेकाल व त्याकालातील साहित्य समजून घेण्यास मदत करणे.
२. मध्ययुगातील महत्त्वाचे पंत व तंत प्रवाह त्यांच्या प्रकृतीसह लक्षात घेण्यास मदत करणे.
३. शिवकाल व पेशवेकाल सामाजिक व राजकीय परिस्थिती समजून घेण्यास मदत होईल.
४. मध्ययुगातील विविध प्रकारच्या लेखनापाठीमागील प्रेरणा समजून घेण्यास मदत होईल.

अ.क्र	घटक	अभ्यासक्रमाचा तपशील	श्रेयांक	तास
१	समर्थ रामदास व समर्थकालीन कवी	१. समर्थ रामदासांचे वाङ्मय २. वेणाबाई ३. समर्थकालीन इतर संत	०.५	०८
२	पंडिती साहित्य	१. पंडिती साहित्याच्या प्रेरणा २. पंडिती साहित्याची वैशिष्ट्ये ३. संत व पंडिती साहित्य तुलना ४. पंडिती साहित्यातील कलात्मकता व कारागिरी ५. महत्त्वाचे पंडित कवी व त्यांचे साहित्य	१	१५
३	शाहिरी काव्य व बखर वाङ्मय	१. शाहिरी काव्याची वैशिष्ट्ये २. पोवाडा व लावणी ३. महत्त्वपूर्ण शाहिरांच्या रचनांचा परिचय ४. बखर गद्याचे स्वरूप व विशेष ५. बखर गद्याच्या प्रेरणा ६. शिवपूर्वकालीन बखरी ७. शिवकालीन बखरी ८. पेशवेकालीन बखरी	१	१५
४	प्रकल्प	मध्ययुगीन पंडितांची व शाहिरांची चरित्रे संकलित करणे, मध्ययुगीन कलाकृतीचे परीक्षण, दोन संप्रदायातील तुलना, महाविद्यालयातील प्राध्यापकांनी विषयानुरूप अन्य विषय येथे प्रकल्प लेखनासाठी देणे अभिप्रेत.	०.५	०७

संदर्भ ग्रंथ :

१. ढेरे रा. चिं. - प्राचीन मराठीच्या नवधारा - मोघे प्रकाशन, कोल्हापूर
२. देशपांडे अ.ना. - प्राचीन मराठी वाङ्मयाचा इतिहास, व्हीनस प्रकाशन, पुणे
३. नसिराबादकर ल.रा. - प्राचीन मराठी वाङ्मयाचा इतिहास, फडके प्रकाशन, कोल्हापूर
४. भावे वि.ल. - महाराष्ट्र सारस्वत, पॉप्युलर प्रकाशन, मुंबई

I/C Principal  
Modern College of Computer Science & IT,  
Aurangabad.

(समर्थ रामदास)

मध्ययुगीन मराठी वाङ्मयाचा इतिहास





डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद.

बी.ए. द्वितीय वर्ष, सत्र - चौथे

CBCS पद्धतीनुसार जून २०२३ पासून लागू

मराठी (ऐच्छिक) - अभ्यासपत्रिका ८ वी

साहित्य प्रकार : नाटक

संकेतांक - CC-2D(8) Marathi

तासिका-५७ तास-४५ श्रेयांक - ०३ गुण-५० (लेखी परीक्षा-४०, प्रात्यक्षिक-१०)

उद्दिष्टे :

१. नाटकाचे स्वरूप व घटक सांगता येतील.
२. नाटकाचे विविध प्रकार उलगडून दाखविण्यास मदत होईल.
३. नाटकातील संवदाचे महत्त्व अधारेखित करता येईल.
४. नाटकाची संहिता व प्रयोगमूल्ये यातील सूक्ष्मता उलगडून दाखवता येईल.
५. नाटकातील जाणिवा समजून सांगता येतील.

अ.क्र	घटक	अभ्यासक्रमाचा तपशील	श्रेयांक	तास
१	नाटकाचे स्वरूप : विशेष	१. अर्थ व व्याख्या २. नाटकाचे स्वरूप विशेष ३. नाटकाची परंपरा व प्रकार	०.५	०८
२	कोंतेय - वि.वा शिरवाडकर	१. 'कोंतेय'चे संविधानक २. 'कोंतेय'मधील कुंती व कर्ण यांच्यातील संवाद सूत्र ३. 'कोंतेय'चे वाङ्मयीन मूल्यमापन ४. 'कोंतेय'चा भाषिक विचार ५. 'कोंतेय'ची ऐतिहासिकता व पौराणिकता	१	१५
३	जलमाचा जोळा - प्रतिमा इंगोले	१. 'जलमाचा जोळा'चे संविधानक २. 'जलमाचा जोळा'मधील स्त्रीवाद ३. 'जलमाचा जोळा'चे वाङ्मयीन विशेष ४. 'जलमाचा जोळा'चे भाषिक विचार ५. 'जलमाचा जोळा'मधील पात्रसृष्टी	१	१५
४	प्रकल्प	एखाद्या नाटकाचे परीक्षण, नाटककाराची मुलाखत, संबंधित प्राध्यापकांनी विषयानुरूप विषय देणे अभिप्रेत आहे.	०.५	०७

संदर्भ ग्रंथ

१. कुलकर्णी अरविंद वामन - मराठी नाट्यलेखन तंत्राची वाटचाल, व्हीनस प्रकाशन, पुणे
२. बनहट्टी श्री.ना - मराठी रंगभूमीचा इतिहास, व्हीनस प्रकाशन, पुणे
३. देशपांडे अ.ना- आधुनिक मराठी वाङ्मयाचा इतिहास, व्हीनस प्रकाशन, पुणे

*Kwaghmare*

I/C Principal

Modern College of Computer Science & I.T.,  
Aurangabad.

(सर्जदार जोगे)  
अध्यक्ष मराठी अभ्यास मंडळ



DR. BABASAHEB AMBEDKAR MARATHIWADA UNIVERS  
AURANGABAD



SYLLABUS OF  
B. A. Honors in Marathi  
Second Year (III, IV Semester)  
(CBCS Semester System)

Under the Faculty of Humanities

FOR  
MODEL COLLEGE, GHANSAWANGI.  
DIST- JALNA.  
(MAHARASHTRA STATE)

(Effective from 2023-24 to onwards)

प्रा. राजेंद्रराव जिणे  
अध्यक्ष, मराठी अभ्यास मंडळ,  
डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ,  
औरंगाबाद.

I/C Principal  
Modern College of Computer Science & IT  
Aurangabad.



Dr. Babasaheb Ambedkar Marathwada University, Aurangabad  
**Model College, Ghansawangi**  
 B. A. Honors in Marathi  
 Second Year III Semester



**Course Structure**

Paper	Course Code	Paper Name	No. of Credits per Course	No. of Lectures per week	Continue Assessment Marks (CA)	University Assessment Marks (UA)	Total Marks
<b>I. Language Curriculum</b>							
Compulsory Language	L-ENG-301	English-III	04	04	40	60	100
Indian Language (Marathi or Hindi)	IL-MAR-301	भारतीय भाषा - मराठी (भाग-3) (मायबोली)	04	04	40	60	100
	IL-HIN-301	Hindi-III					
<b>II. Major Curriculum</b>							
Major Core	Core A	C-MAR-301	05	05	20	30	50
	Core B	C-MAR-302	05	05	20	30	50
Supportive	S-MAR-301	अनुवादित साहित्य	04	04	40	60	100
Applied	A-MAR-301	उपयोजित लेखन	04	04	40	60	100
<b>III. Life Skill Curriculum</b>							
Job Oriented Curriculum	LSC-301	Job Oriented Curriculum-III	02	02	20	30	50
Value Oriented Curriculum	LSC-302	Value Oriented Curriculum-III	02	02	20	30	50
<b>Total</b>			<b>30</b>	<b>30</b>	<b>240</b>	<b>360</b>	<b>600</b>

प्र.सर्जेराव जिगे  
 अध्यक्ष, मराठी अभ्यास मंडळ,  
 डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ,  
 औरंगाबाद.

*Kwaghmare*  
 H.C. Principal  
 Modern College of Computer Science & I.T.,  
 Aurangabad.



### Scheme of Evaluation (Marks Distribution)



#### For 20 Marks Continuous Assessment

- |                                 |          |
|---------------------------------|----------|
| 1) Continuous Assessment (C.A.) | 20 Marks |
| Two Class Test Each for         | 05 Marks |
| One Home Assignment for         | 10 Marks |
| 2) University Assessment (U.A.) | 30 Marks |

#### For 40 Marks Continuous Assessment

- |                                 |          |
|---------------------------------|----------|
| 1) Continuous Assessment (C.A.) | 40 Marks |
| Two Class Test Each for         | 10 Marks |
| One Home Assignment for         | 10 Marks |
| One Seminar for                 | 10 Marks |
| 2) University Assessment (U.A.) | 60 Marks |

*K. V. Ghose*

V.C. Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद.

मॉडेल कॉलेज घनसावंगी, जि. जालना

बी.ए., बी.कॉम/बी.एस्सी., द्वितीय वर्ष, सत्र-तिसरे

CBCS पद्धतीनुसार जून २०२३ पासून लागू

अभ्यासपत्रिका ३ री - भारतीय भाषा : मराठी (भाग-३ रा)

संकेतांक - MAR-IL301 Marathi

तालिका-६०

श्रेयांक - ४ गुण-१०० (लेखी परीक्षा-६०, प्रात्यक्षिक-४०)



अर्हे :

१. विद्यार्थ्यांच्या मराठी निवडक लेखांच्या परिशीलनाचे मूल्यात्मक वाढ होईल.
२. रसायनाद क्षमता वाढीस लागेल.
३. दिकेकवादाची व शैक्षणिक दृष्टिकोनाची कास धरण्यास मदत होईल.
४. लेखनातील विविध प्रवृत्ती व प्रकृती समजण्यास मदत होईल.
५. वृत्तमशील लेखनाकरिता उद्युक्त करण्यास मदत होईल.

क्र.सं.	घटक	अभ्यासक्रमाचा तपशील	श्रेयांक	तात
१	मराठी विभाग	१. हसा आणि लड्डू व्हा - निर्मलकुमार फडकुले २. ब्रह्मचर्य समाजाचे शिक्षण - भा.ल. भोळे ३. रीते जयाचे पार्श्वक बळिया - किशोर सानप ४. रमई - मशवंत मनोहर ५. निरोप - राजकुमार तांगडे ६. काकणबोली - अनिता मलमटे	१	२५
२	मराठी विभाग	१. सागरतल - स्वातंत्र्यवीर वि.दा. सावरकर २. जुगाच्या खांद्यावर - आरती प्रभू ३. आवाहन - दत्ता हलसगीकर ४. मशहूरुषा ! - हिमा बनसोडे ५. क्रियाशील - नामनाथ पाटील ६. मराठी माती - वा.ना. आंधळे ७. पिंपळखोपा - निशिकांत अग्रते ८. हुमंभी बाग आहे ती - शेख आब्दुद ९. सौम्य - उर्मिला चाकूरकर १०. अतिक्रमण - विशाल इंगोले ११. बिरलाईता - सखाराम डाजोरे १२. आळवण - विकास जगताप	१	२५
३	उपरोक्त मराठी	१. वृत्तमंकलन व निवेदन २. बँटवीपीटी ३. सदर लेखन ४. सारांश लेखन	०.५	०८
४	प्रकल्प	संबंधित प्राध्यापकांनी विद्यार्थ्यांकडून विद्ययातुकृत प्रकल्प पूर्ण करून घ्यावेत.	०.५	०८

IC Principal  
Modern College of Computer Science & IT,  
Aurangabad.



डॉ.बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद  
मॉडेल कॉलेज घनसावंगी जि.जालना

बी.ए ऑनर्स मराठी द्वितीय वर्ष सत्र तिसरे CBCS पध्दती नुसार जून 2023 पासून लागू

संकेतांक - C-MAR-301

कोअर -ए मराठी(मध्ययुगीन काव्य)

तासिका -75 श्रेयांक - 05 गुण-50 (लेखीपरीक्षा-30, प्रात्यक्षिक-20)



घटक - 01 निवडक अभंग

1. अभंग आविष्कार - संपादन- मराठी अभ्यास मंडळ

संदर्भ ग्रंथ :

1. अभंग आविष्कार - संपादन- मराठी अभ्यास मंडळ  
(डॉ.बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद)
2. संत तुकारामाचा साहित्यिक व सांस्कृतिक जनसंवाद - डॉ. रामचंद्र झाडे
3. पाच संत चरित्रे - गौ. नि. दाडेकर
4. पाच संतचरित्रे - अनंत पैटणकर

प्रा.सर्जेराव जिगे

अध्यक्ष, मराठी अभ्यास मंडळ,  
डॉ.बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ,  
अध्यक्ष, मराठी अभ्यास मंडळ

16/06/2023

Principal, Modern College of Computer Science & I.T.,  
Aurangabad.

Kwaghmare

i/c Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.



डॉ.बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद

मॉडेल कॉलेज घनसावंगी जि.जालना

बी.ए ऑनर्स मराठी द्वितीय वर्ष सत्र तिसरे CBCS पध्दती नुसार जून 2023 पासून लागू

संकेतांक - C-MAR-302

कोअर-बी मराठी, आधुनिक कविता

तासिका -75 श्रेयांक - 05 गुण-50 (लेखीपरीक्षा-30, प्रात्यक्षिक-20)

घटक - 01

१. भूईभोग - संदीप जगताप.

घटक - 02

१. मला हवी असणारी पहाट - प्रतिभा राजानंद

संदर्भ ग्रंथ :

१. सर्जन प्रेरणा आणि कवित्व शोध - म.सु. पाटील
२. कविता आणि प्रतिमा- सुधीर रसाळ
३. कविता १९६९ ते १९८४- विलास सारंग
४. १९८० नंतरची स्त्रीवादी कविता- सदाशिव सरकटे

प्र.सर्जराव जिगे  
अध्यक्ष, मराठी अभ्यास मंडळ,  
डॉ.बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ,  
औरंगाबाद.  
प्र.डॉ. सर्जराव जिगे  
अध्यक्ष, मराठी अभ्यास मंडळ

IC Principal  
Modern College of Computer Science & I.T.  
Aurangabad.





डॉ.बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद  
मॉडेल कॉलेज घनसावंगी जि.जालना  
बी.ए ऑनर्स मराठी द्वितीय वर्ष सत्र तिथी CBCS पध्दती नुसार जून २०२३ पासून लागू  
संकेतांक - S-MAR-301  
सर्पोटिव्ह मराठी, अनुवादित साहित्य  
तासिका -60 श्रेयांक - ०4 गुण-100 (लेखीपरीक्षा-60, प्राग्पक्षिक-40)

१. चिमणी -अनुवादक . गुण खराटे

(भगवानदास घोरवाल यांच्या बहुचर्चित शाकुंतिका या हिंदी उपन्यासाचा मराठी अनुवाद)

२. एक स्वप्न पुन्हा पुन्हा. अनुवादक. विजय पाडळकर

(मूळ कवी गुलजार. हिंदी )

संदर्भ ग्रंथ :

१. अनुवाद, वर्णमालावस्था आणि धी . सूर्यनारायण रत्नशुभे
२. भाषांतर आणि भाषा (विलास सारंग)
३. अनुवाद भीर्मासा संपादक के.अश्व नुपे
४. भाषांतर भीर्मासा . कल्याण काळे/ अजंती चौधरी
५. भाषांतर -सदा क.हाडे
६. अनुवाद विज्ञान . भोलानाथ निवारी

डा.सज्जराव जिने  
अध्यक्ष, मराठी अभ्यास मंडळ,  
मॉडेल कॉलेज घनसावंगी, जालना

डा.डॉ. सज्जराव जिने  
अध्यक्ष, मराठी अभ्यास मंडळ

*Kwaghmare*  
HC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

डॉ.बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद  
मॉडेल कॉलेज घनसावंगी जि.जालना

बी.ए ऑनर्स मराठी द्वितीय वर्ष सत्र तिसरे CBCS पध्दती नुसार जून २०२३ पासून लागू  
संकेतांक - A-MAR-301

अप्लाय्ड मराठी, उपयोजित लेखन

तासिका -60 श्रेयांक - ०4 गुण-100 (लेखीपरीक्षा-60, प्रात्यक्षिक-40)

घटक ०१ ओवी, अभंग, भारुड आकलन व आस्वाद

घटक ०२ कीर्तन परंपरा आकलन व आस्वाद

कीर्तन: प्रकार, स्वरूप

घटक ०३ पोवाडा लेखन : आकलन व आस्वाद

पोवाडा : प्रकार, स्वरूप

घटक ०४ लोकगीते व लोककथा गीते : आकलन व आस्वाद

संदर्भ ग्रंथ :

१. कीर्तन परंपरा - डॉ. यशवंत पाठक

२. लोकसंचित - तारा भवाळकर

३. लोकसाहित्याचे स्वरूप - प्रभाकर मांडे

४. भारुड वाडमयातील तत्त्वज्ञान : डॉ. रामचंद्र देखणे

५. भारुड : राजा मंगळवेढेकर

६. मराठी-हिंदी भारुड काव्य एक अभ्यास : डॉ.सौ.सुमती देशपांडे

प्रा.सर्जेराव जिगे  
अध्यक्ष, मराठी अभ्यास मंडळ,  
डॉ.बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ,  
औरंगाबाद.

प्रा.डॉ. सर्जेराव जिगे  
अध्यक्ष, मराठी अभ्यास मंडळ

डॉ.बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद  
मॉडेल कॉलेज घनसावंगी जि.जालना

बी.ए./बी.कॉम/बी.एस्सी.द्वितीय वर्ष सत्र चौथे CBCS पध्दती नुसार जून 2023 पासून लागू

भारतीय भाषा: मराठी (भाग-4)

संकेतांक -IL-MAR-401

H.C. Pringalpa  
Modern College of Computer Science S.L.  
Aurangabad.



DR. BABASAHEB AMBEDKAR MARATHIWADA UNIVERSITY,  
AURANGABAD

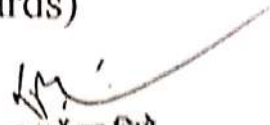


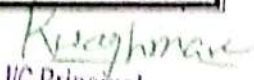
SYLLABUS OF  
B. A. Honors in Marathi  
Second Year (III, IV Semester)  
(CBCS Semester System)

IV sem.  
Under the Faculty of Humanities

FOR  
MODEL COLLEGE, GHANSAWANGI.  
DIST- JALNA.  
(MAHARASHTRA STATE)

(Effective from 2023-24 to onwards)

  
प्र. राजेंद्राजी दिगे  
अध्यक्ष, मराठी अकादमी संस्थान,  
पं. बाबासाहेब अम्बेडकर मराठीवादा विश्वविद्यालय,  
अहमदाबाद.

  
H/C Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad  
Model College, Ghansawangi

B. A. Honors in Marathi  
Second Year IV Semester



Course Structure

Paper	Course Code	Paper Name	No. of Credits per Course	No. of Lectures per week	Continue Assessment Marks (CA)	University Assessment Marks (UA)	Total Marks	
<b>I. Language Curriculum</b>								
Compulsory Language	L-ENG-401	English-IV	04	04	40	60	100	
Indian Language (Marathi or Hindi)	IL-MAR-401	भारतीय भाषा - मराठी (भाग-4) (माध्यमबोली)	04	04	40	60	100	
	IL-HIN-401	Hindi-IV						
<b>II. Major Curriculum</b>								
Major Core	Core A	C-MAR-401	कथात्मक साहित्य भाग-४	05	05	20	30	50
	Core B	C-MAR-402	नाट्यात्मक साहित्य	05	05	20	30	50
Supportive	S-MAR-401	विशेष कलाकृतीचा अभ्यास	04	04	40	60	100	
Applied	A-MAR-401	प्रायोगिक लोककला	04	04	40	60	100	
<b>III. Life Skill Curriculum</b>								
Job Oriented Curriculum	LSC-401	Job Oriented Curriculum-IV	02	02	20	30	50	
Value Oriented Curriculum	LSC-402	Value Oriented Curriculum-IV	02	02	20	30	50	
<b>Total</b>			30	30	240	360	600	

I/C Principal  
Modern College of Computer Science & I.T.  
Aurangabad





डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद.

मॉडेल कॉलेज घनसावंगी, जि. जालना

बी.ए., बी.कॉम/बी.एस्सी., द्वितीय वर्ष, सत्र-चौथे

CBCS पद्धतीनुसार जून २०२३ पासून लागू

अभ्यासपत्रिका ४ धी - भारतीय भाषा : मराठी (भाग-४ था)

संकेतांक - MAR-IL401 Marathi

तासिका-६० श्रेयांक - ४ गुण-१०० (लेखी परीक्षा-६०, प्रात्यक्षिक-४०)

विद्यार्थ्यांच्या ठिकाणी श्रममूल्याची वाढ होईल.

सामाजिक संवेदनशीलता वाढीस लागेल.

विवेकवादाची व वैज्ञानिक दृष्टिकोनाची कास धरण्यास मदत होईल.

लेखनातील विविध प्रवृत्ती व प्रकृती समजण्यास मदत होईल.

सृजनशील लेखनाकरिता उद्युक्त करण्यास मदत होईल.

अ.क्र	घटक	अभ्यासक्रमाचा तपशील	श्रेयांक	तास
१	गद्य विभाग	१. श्रमजीविका - विनोबा भावे २. आईचं पत्र - रत्नाकर मतकरी ३. समाजक्रांतीचे उदगाते कबीर, फुले - जी.ए. उगले ४. शब्द - सुधा खंराटे ५. केळेवाडी परिसरातील युगपुरूष - मुरहरी केळे ६. आडोसा - लक्ष्मीकमल गेडाम	१	१५
२	पद्य विभाग	१. घंटा - वि.दा. करंदीकर २. आकाशी झेप घे रे पाखरा - <del>वि.दा. करंदीकर</del> जगदिश स्नेहुरकर ३. जगत आलो असा - सुरेश भट ४. असे जगावे दुनियेमध्ये - गुरू ठाकूर ५. मी असे कित्येक पाहिलेत अश्वत्थामे - देवकर्ण मदन ६. जमीन - केशव देशमुख ७. वारकरी बाप - विनायक पवार ८. शोधा ज्याचे त्याने - नितीन देशमुख ९. विकृतीची लवतरे - धोंडोपंत मानवतकर १०. शृंगार मराठीचा - संगीता कदम-झिजुरके ११. भांडणाचा प्रश्नच कुठं येतो रे ? - डी.के. शेख १२. मला तो परत भेटला - सुदेश इंगळे	१	१५
३	उपयोजित मराठी	१. संगणक व मराठी भाषा २. सृजनात्मक लेखन ३. अग्रलेख ४. पत्रलेखन व टिप्पणी	०.५	०६
४	प्रकल्प	संबंधित प्राध्यापकांनी विद्यार्थ्यांकडून विषयानुकूल प्रकल्प पूर्ण करून घ्यावेत.		

Modern College of Computer Science & I.T.  
Aurangabad.



डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद  
 मॉडर्न कॉलेज अन्वयासंगी जि. जालना  
 डॉ. बाबासाहेब आंबेडकर महोदय चौधे CBCS पध्दती नुसार जून २०२३ पासून लागू  
 बौद्धिक - (C-MAR-401)  
 कोवळतू मराठी, कथात्मक साहित्य  
 सामिका - २५ अंकांक - २५ गुण-३० (लेखीपरीक्षा-३०, प्रात्यक्षिक-२०)



सक. डॉ. मीरिया (कथात्मक) - मराठी मंडळ

सक. डॉ. संजय बाबासाहेब मिसरी

संदर्भ ग्रंथ:

१. मराठी कथात्मक साहित्य - अमर्त्या तेलंग
२. मराठी कथात्मक साहित्य - डॉ. मतीर अंबेडकर
३. मराठी कथात्मक साहित्य - डॉ. मतीर अंबेडकर
४. मराठी कथात्मक साहित्य - डॉ. मतीर अंबेडकर
५. मराठी कथात्मक साहित्य - डॉ. मतीर अंबेडकर
६. मराठी कथात्मक साहित्य - डॉ. मतीर अंबेडकर

प्रा. सजेंराव जिगे  
 अध्यक्ष, मराठी अभ्यास मंडळ,  
 डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ,  
 औरंगाबाद.  
 प्रा. डॉ. सजेंराव जिगे  
 अध्यक्ष, मराठी अभ्यास मंडळ

I/C Principal  
 Modern College of Computer Science & I.T.,  
 Aurangabad.



डॉ.बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद  
मॉडेल कॉलेज घनसावंगी जि.जालना  
बी.ए ऑनर्स मराठी द्वितीय वर्ष सत्र चौथे CBCS पध्दती नुसार जून 2023 पासून लागू  
संकेतांक - C-MAR-402  
कोअर-बी मराठी, नाट्यात्मक साहित्य  
तासिका -75 श्रेयांक - 05 गुण-50 (लेखीपरीक्षा-30, प्रात्यक्षिक-20)

घटक - 01 नाटक

- १ भाई तुम्ही कुठे आहात? - त्रयिकेश कांबळे.
- २ देवबाभली - प्राजक्त देशमुख

संदर्भ ग्रंथ :

१. मराठी नाटक आणि रंगभूमी - वसंत आबाजी डहाके
२. मराठी नाटक सृष्टी आणि दृष्टी - मधू जामकर
३. मराठी नाटक सत्याचा आभास - अभय पिंगळे
४. नाटक सांगोपांग- नीलकंठ कदम
५. छडक आणि पाणी -गंगाधर गाडगीळ
६. मराठी रंगभूमीचा इतिहास भाग एक- श्री. ना. बंनहट्टी
७. मराठीचा नाट्यसंसार- वि. स. खांडेकर

प्रा.सर्जेराव जिगे  
अध्यक्ष, मराठी अभ्यास मंडळ,  
डॉ.बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ,  
प्रा.डॉ. सर्जेराव जिगे  
अध्यक्ष, मराठी अभ्यास मंडळ

*Kwajhmar*  
I/C Principal  
Modern College of Computer Science & I.T.  
Aurangabad.

डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद  
मॉडेल कॉलेज घनसावंगी जि. जालना  
बी.ए. ऑनर्स मराठी द्वितीय वर्ष सत्र चौथे CMCS पध्दती पुस्तक जून २०२३ पासून लागू  
संकेतांक - S-MAR-401

सधोदित मराठी, विशेष कलाकृतीचा अभ्यास  
तारिका - 60 श्रेयांक - ०४ गुण - 100 (लेखीपरीक्षा - 60, प्रात्यक्षिक - 40)

१. जेका मुराखी राजा होतो (चरित्र) - निमालीराव धनार
२. धिव राधू (पत्रावक कादंबरी) - धोमिराज बाभुल

संदर्भ ग्रंथ :

१. मराठी चरित्र : रूप आणि इतिहास - जयंत वाघ
२. कादंबरीविषयी. हरिश्चंद्र धोरात
३. सृजनशोध आणि लिहिता लेखक विकलास सारंग
४. साहित्याची विविध प्रकिया. डॉ. आनंद सादव

डा. राजेंद्राव जिगे  
अध्यक्ष, मराठी अभ्यास मंडळ,  
डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ,  
प्री.डॉ. राजेंद्राव जिगे  
अध्यक्ष, मराठी अभ्यास मंडळ

IC Principal  
Modern College of Computer Science & IT  
Aurangabad



डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद  
मॉडेल कॉलेज घनसावंगी जि.जालना  
बी.ए ऑनर्स मराठी द्वितीय वर्ष सत्र चौथे CBCS पध्दती नुसार जून २०२३ पासून लागू.  
संकेतांक - A-MAR-401  
अप्लाइड मराठी, प्रायोगिक लोककला  
तासिका -60 श्रेयांक - ०४ गुण-100 (लेखीपरीक्षा-60, प्रात्यक्षिक-40)

१. तमाशा, लावणी, कलगीतुरा
२. वगनाट्य, बहुरूपी, वासुदेव
३. विधी नाट्य-स्वरूप, परंपरा व प्रकार
४. जागरण-गोंधळ
५. पोतराज, पांगूळ, गुडगुडीवाला, कुडमुडे जोशी

संदर्भ ग्रंथ :

१. कीर्तन परंपरा - डॉ. यशवंत पाठक
२. लोकसंचित - तारा भवाळकर
३. लोकसाहित्याचे स्वरूप - प्रभाकर मांडे
४. लोकसाहित्य मिमांसा - शिंदे विश्वनाथ
५. लोकसाहित्य बदलते संदर्भ बदलतीरूपे - गंगाधर मोरजे
६. लोकसाहित्य शोध आणि समीक्षा - रा. चिं. डेरे
७. लोकसाहित्य शोध आणि समीक्षा - डॉ. चंद्रशेखर जोशी

प्रा.सर्जेराव जिगे  
अध्यापक, मराठी अभ्यास मंडळ,  
डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ,  
औरंगाबाद  
प्रा.डॉ. सर्जेराव जिगे  
अध्यक्ष, मराठी अभ्यास मंडळ

*Kwaghmare*  
IIC Principal  
Modern College of Computer Science & I.T.,  
Aurangabad.

