



**Rayat Shikshan Sanstha's**  
**Yashavantrao Chavan Institute of Science Satara**  
**(Autonomous)**  
**Department of B.Sc.(Computer Science)(Entire)**

**Syllabus Implemented from June, 2018**

**Rayat Shikshan Samnsta's**

**Yashavantrao Chavan Institute of Science Satara  
(Autonomous)**

**Syllabus for Bachelor of Science Part – I**

- **TITLE :** B.Sc. (Computer Science) (Entire)
- **YEAR OF IMPLEMENTATION :** 2018-19

**PREAMBLE:**

There are bright career prospects for computer science professionals or software professionals in recent scenario. With the opening of huge software and IT companies in India, the job opportunities for trained professionals have increased considerably. India is known to be a leader in software and IT sector.

Computer science graduates pass out find job opportunities in a variety of environments in academia, research, industry, government, private, business organizations and so on.

They are involved in analyzing problems for solutions, formulating and testing, using advanced communications or multi-media equipment, or working in teams for product development.

The software and IT companies are the major employers of computer science graduates. They offer the best packages to the young graduates which are unmatched with other branches of science.

- **GENERAL OBJECTIVES OF THE COURSE :**
  - The content of the syllabus have been framed as per UGC norms of CBCS Pattern.
  - The students are expected to understand the fundamentals, principles, mathematical, recent IT concepts and recent developments in the subject area.
  - The practical course is in relevance to the theory courses to improve the understanding of the concepts.
  - It is expected to inspire and boost interest of the students towards Computer Science as the main subject.
  - To develop the power of appreciations, the achievements in Computer and role in nature and society.
  - To enhance student sense of enthusiasm towards IT and to involve them in an intellectually stimulating experience of learning in a supportive environment.
- **DURATION :** 3 YEAR
- **PATERN :** CBSC SEMISTER
- **MEDIUM OF INSTRUCTION :** ENGLISH

• **STRUCTUTRE OF COURSE :**

- FIRST SEMESTER ----- (NO OF THEORY & PRACTICAL PAPERS )

<b>B. Sc. I SEMESTER– I (Duration – 6 Months)</b>									
<b>Sr.</b>	<b>SUBJ ECT</b>	<b>PAPER NO AND TITEL</b>	<b>TEACHING SCHEME</b>						
<b>No</b>	<b>TITL E</b>		<b>Theory</b>			<b>Practical</b>			
			<b>No. of lecture s</b>	<b>Hours</b>	<b>Credits</b>	<b>Subject</b>	<b>No. of lectures</b>	<b>Hours</b>	<b>Credit s</b>
1	BCSE-101	Introduction to Computer	3	2.4	2	BCSE-110: LAB1- COMP	4	3.2	2
2	BCSE-102	C Programming-I	3	2.4	2				
3	BCSE-103	Discrete Mathematical Structure	3	2.4	2	BCSE- 111: LAB2- MATHS	4	3.2	2
4	BCSE-104	Algebra	3	2.4	2				
5	BCSE-105	Computational Statistics I	3	2.4	2	BCSE- 112: LAB3- STATS	4	3.2	2
6	BCSE-106	Statistical Methods I	3	2.4	2				
7	BCSE-DSC-107	Electronic Fundamentals for Computer	3	2.4	2	BCSE- 113: LAB4- ELECTRO NICS	4	3.2	2
8	BCSE-108	Discrete electronic for Computer	3	2.4	2				
9	BCSE-AECC 1	English for communication I	3	2.4	2				
	<b>Total of SEM I</b>		<b>27</b>	<b>21.6</b>	<b>18</b>		<b>16</b>	<b>12.8</b>	<b>8</b>

Subject	Paper	ESE	Internal Exam		Subject	Practical-I		Submission	
			CCE-I	CCE-II (Online Test)		Exam	Journal	Case study/Educational Tour/Seminar	Day to day Performance
BCSE-101	Introduction to Computer	30	5	5	BCSE-110: LAB1-COMP	30	5	5	5
BCSE-102	C Programming-I	30	5	5					
BCSE-103	Discrete Mathematical Structure	30	5	5	BCSE-111: LAB2-MATHS	30	5	5	5
BCSE-104	Algebra	30	5	5					
BCSE-105	Computational Statistics I	30	5	5	BCSE-112: LAB3-STATS	30	5	5	5
BCSE-106	Statistical Methods I	30	5	5					
BCSE-107	Electronic Fundamentals for Computer	30	5	5	BCSE-113: LAB4-ELECTRONICS	30	5	5	5
BCSE-108	Discrete electronic for Computer	30	5	5					
BCSE-AECC1	English for communication I	40	5	5					
<b>Total of SEM I</b>	<b>TOTAL</b>	280	45	45	0	120	20	20	20
	<b>GRAND TOTAL</b>	<b>550</b>							

• SECOND SEMESTER ----- (NO OF THEORY & PRACTICAL PAPERS)

B. Sc. I SEMESTER– II (Duration – 6 Months)									
Sr.	SUBJECT	PAPER NO AND TITEL	TEACHING SCHEME						
No.	TITLE		Theory			Practical			
			No. of lectures	Hours	Credits	Subject	No. of lectures	Hours	Credits
1	BCSE-201	Office Automation	3	2.4	2	BCSE- 210: LAB5- COMP	4	3.2	2
2	BCSE-202	C Programming-II	3	2.4	2				
3	BCSE-203	Graph Theory and Algorithms	3	2.4	2	BCSE- 211: LAB6- MATHS	4	3.2	2
4	BCSE-204	Calculus	3	2.4	2				
5	BCSE-205	Computational Statistics II	3	2.4	2	BCSE- 212: LAB7- STATS	4	3.2	2
6	BCSE-206	Statistical Methods II	3	2.4	2				
7	BCSE-207	Electronic Circuit for Computer	3	2.4	2	BCSE- 213: LAB8- ELECTRO NICS	4	3.2	2
8	BCSE-208	Digital Fundamental for Computer	3	2.4	2				
9	BCSE-AECC 2	English for communication II	3	2.4	2				
	<b>Total of SEM I</b>		<b>27</b>	<b>21.6</b>	<b>18</b>		<b>16</b>	<b>12.8</b>	<b>8</b>

Subject	Paper	ESE	Internal Exam		Subject	Practical-I		Submission	
			CCE-I	CCE-II (Online Test)		Exam	Journal	Case study/Educational Tour/Seminar	Day to day Performance
BCSE-201	Office Automation	30	5	5	BCSE-210: LAB5-COMP	30	5	5	5
BCSE-202	C Programming-II	30	5	5					
BCSE-203	Graph Theory and Algorithms	30	5	5	BCSE-211: LAB6-MATHS	30	5	5	5
BCSE-204	Calculus	30	5	5					
BCSE-205	Computational Statistics II	30	5	5	BCSE-212: LAB7-STATS	30	5	5	5
BCSE-206	Statistical Methods II	30	5	5					
BCSE-207	Electronic Circuit for Computer	30	5	5	BCSE-213: LAB8-ELECTRONICS	30	5	5	5
BCSE-208	Digital Fundamental for Computer	30	5	5					
BCSE-AECC1	English for communication II	40	5	5					
<b>Total of SEM I</b>	<b>TOTAL</b>	280	45	45	0	120	20	20	20
	<b>GRAND TOTAL</b>	<b>550</b>							

• **Structure and Titles of Papers of B.Sc. Course :**

**B.Sc. I Semester I**

Sr.No.	Paper No.	Paper Name
1	BCSE-101	Computer Organization
2	BCSE-102	C Programming-I
3	BCSE- 103	Discrete Mathematical Structure
4	BCSE- 104	Computational Algebra
5	BCSE- 105	Computational Statistics I
6	BCSE- 106	Statistical Methods I
7	BCSE- 107	Electronic Fundamentals for Computer
8	BCSE- 108	Discrete Electronic for Computer
9	BCSE- 109	English for Communication - I

**B.Sc. I Semester II**

Sr. No.	Paper No.	Paper Name
1	BCSE-201	Office Automation
2	BCSE-202	C Programming-II
3	BCSE- 203	Graph Theory and Algorithms
4	BCSE- 204	Computational Calculus
5	BCSE- 205	Computational Statistics II
6	BCSE- 206	Statistical Methods II
7	BCSE- 207	Electronic Circuit for Computer
8	BCSE- 208	Digital Fundamental for Computer
9	BCSE- 209	English for Communication - II

**3) OTHER FEATURES:**

**A) LIBRARY:**

Sr.No.	Book Name	Authors Name
1	Multimedia and web Technology	Mukesh Kumar
2	Multimedia and web Technology	Mukesh Kumar
3	Businesses Stat	P.K. Vishwanathhan
4	Introduced to Sol	Reek F. Vonner Lans
5	O.S Principles	Ahraham Silberschat
6	HTML 4	Rick Doread
7	Stat for Mgmt.	Rickhot I. Levn
8	Victory Guide Probability & Kandom prob	Dr. A.Singaravelu
9	Prob. And queeing theory	G.Balaji
10	Programmngn ANSI,C	E. Balgursam
11	Cracle db 109	Kevin Loney
12	E-Commerece	David utiteley

13	Ascii	E. Balgursamy
14	Desktop application a Microsoft windows XP O.S	Waltergleny
15	Android	Jerome J. F.
16	Java	Josepseph O. Nil
17	Fundamentals of S.F	Rajib Mall
18	Compiler Design	Dr. O. G.Kakade
19	80st lic & embedded sym	M.A. Mazidi
20	Information Security	R. F. Smith
21	Fundamental of DBMS	Romez Elmasn
22	Operating System	Milon Milenkovie
23	Unix in Easy	Mohamad Azam
24	Digital Camp electronics	Abbert malvino
25	E-Commerce	Hony chan
26	Programming with C	K. R. Venugopal
27	Web publishen with HTML	Devid Fox
28	Sherlock Holmen	Arthor Conon
29	Corporate Chanakkya	Radhakrushnan Pille
30	Comp H/w & N/w	I.E. Dayanand
31	Photoshop 6	Firwall media
32	Web Designing	Vishnu Priya Sing
33	Operation Research	J. K. Sharama
34	Arithmetic & quantitive aptitude	R. Bopal
35	Fundamental of English usage	BBA/HM
36	General knowledge	BBA/HM
37	Fundamental of researching	BBA/HM
38	Fundamental of researching	BBA/HM
39	Theory & prob with applications	Nem Sing
40	Engg mathematics	N. Vynakatromon
41	Mathematics Capsul	Guozox Kapur
42	Quiker maths	M. Tyra
43	Object oriented programming	E. Balgurusamy
44	Algebra	S. K. Goyal
45	Java programming	Dramdake s/w teami
46	Business Statistics	N. P. Vohavea
47	Accounting with tally 9.0	Dinesh Moidasoni
48	Electronics Components	K. Pandmanabha
49	Applied mathematics	G. V. Kurbojkar
50	Computer N/W	Tononbam
51	Cryptography & N/W Security	B.L. Chonilathe
52	Linear programming & Decision making	A.S. Narag
53	Comp. Organization	Rashami Sharama
54	Electrical Circuit theory	A.Balkrushan
55	Applied mathematics	G.V.Kumbhojkar
56	RDBMS Design & Oracle	See Net



57	Operations Research	Nitin Kulkarni
58	Oracles 8 DBA AQL & RL/SQL	Michael R.Ault
59	Embedded Systems	Raj. Kamal
60	Rescued by active Server (Asp.Net)	Kris Jamsa
61	UNIX Complete	Peter Dyson, John Hellborn
62	Management info sym	James A O Brien
63	Analysis & design of Algo C & C++	Prof. S. Nandagopalan
64	DSP	Rafael C.Gonzalez
65	Operating System	Gupta Chaturvedi
66	Operating System	Willam Stallings
67	Digital Electronics	A.P. Godase
68	Transforms & particle diff. equation	Dr. J. John
69	Software Quality Assurance	Sikkim manipal Uni.
70	Software Engineering	C.Shiny Kirusa
71	Programming with C++	D.Ravichandarn
72	Fundamental of Soft Engi	Rajib Mall
73	Advanced up	A.P. Godase
74	Numerical methods	G. Balaji
75	Computer Organization	Carl Hamcher
76	Photoshop C.S.	Shruti Lal
77	Operational System	Madnieb Donavan
78	Probability R.V. & R.	P.Kandasamy
79	Ordinary Differential equation	S.G. Deo
80	Stat & Numerical methods	G. Balaji
81	Advanced Engi. Math.	S.F. Jamanadas & Co
82	Probability & queueing	G.Balaji
83	Data structure & Algo Ana inc.	Mark Alen weiss
84	Stat & Numerical Methods	Dr. A. Singaravelu
85	Let us C.	Yashvant anetkar
86	Comp Business Statistics	Amir D. Aezel
87	Electronics Device & Ckt	A.P. Godase
88	Power Electronics	B.R. Gupta
89	Micro Processor & Micro Controller	Krishan Kant
90	Database sym Concept	Siberschatz
91	Database sym Concept	Siberschatz
92	Microwave Engineering	Annapurna Das
93	Adv. Java technology	A.A. Puntambekar
94	Gathode	P.L. Deshpande
95	Maza Ladha	Adolf Hitler
96	1001 Comp Hints & tips	Christopher Cavanaugh
97	IT Security	Taxmana publicatn
98	Chandaragupta	G.V. Salavi
99	VB. Net	Vishnu Priya Singh
100	Critical & manag prof docu using office word 2007	Niti

101	Comp oper & prog Assistant	A.assian publication
102	C.Prog	I.Edwin Dayanand
103	Indian economy	V.K. Bahargav
104	Data Communication and N/W	Forouzan
105	Oxford Dictionary	Sara Hawker
106	Pocket Dictionary	Chs Publication
107	Capsul Math	Asian
108	Elec Communication	George Kennedy
109	HTML, DHTML-JAVA Script	Even Bayrott
110	Adob Photoshop	Vishnu Priya Singh
111	Laptop Course	Vishnu Priya Singh
112	MS Office	Vishnu Priya Singh
113	Dreamweaver 4	Christophe AUBRY
114	Fundamentals of DBMS	Sikkim Manipal University
115	Internet & Web Designing	Ramesh Bangra
116	Cyber Crime, Electronic Evidence & Investigation	Vivek Sood
117	Terrorism	Prof. Rakesh Sinha
118	Statistics For Economics Textbook	
119	Cerdit Appraisal, Risk Analysis & Decision Making	D.D. Mukharjee
120	Database System Concept	Abraham Silberschatz
121	Pro C# with NET 3.0	Andrew Troelsen
122	Red Hat Linux Ver(10)	Christopher Negus
123	Business Statistics	N. P. Vohora
124	Software Engineering	Roger S. Pressman

**B) SPECIFIC EQUIPMENTS :**

1. Computers
2. Printer, Scanners
3. LCD Projector
4. LCD Projector Screen
5. Smart Board
6. Visualizer
7. CRO's
8. Regulated Power Supplies
9. Function Generators
10. Multimeter, Voltmeters, Ammeters
11. Resistance Boxes/Rheostats

**Head  
Dept of BSc CS Entire**

**Theory: BCST 101: Computer Organization**

**Learning Objectives:-**

- i) To learn fundamental concepts of computers, inputs ,outputs
- ii) To learn the concepts Operating System.
- iii) To learn the principle of Office Automation.
- iv) To learn the problem solving using Computers.

**BCSE-101: Computer Organization**

**Learning Objectives:-**

- i. To Develop a Programming logic.
- ii. To teach basic principles of programming .
- iii. To develop skills for writing programs using 'C'.

**Unit –1 Introduction to Computer and Basic Organization (9)**

Definition of computer, characteristics, limitations, concepts of h/w and s/w, Evolutions, Generations, classification based on size and Purpose, applications of computers in various fields, computer languages –high level, low level, assembly level, compiler, interpreter.  
Block diagram - Input Unit, Memory Unit, Output unit, Central processing unit

**Unit –2 Input, Output Devices and Concept of Memory (9)**

Input devices: - Keyboard, Mouse, Joystick, Touch screen, Scanner, MICR, OMR, Barcode reader., Output devices: - VDU, Printers – Dot-matrix, Inkjet, Laser, Line, Plotters  
Memory – Semiconductor and Magnetic memory., Secondary Storage devices: - Magnetic disk, Magnetic tape, Optical disk -CD ROM

**Unit –3 Operating System concepts (9)**

Definition and Functions of O.S.,Types of O.S. –Single user, Multiuser.  
Process Management-Multiprogramming, Multitasking, Multiprocessing, Time sharing.  
Disk Operating System (DOS), Booting Processes , DOS internal and External commands, concept of directory and file.  
Windows Operating system : Features of Windows O.S., GUI  
Open Source Operating System- Ubuntu Windows accessories – Paintbrush, Notepad.

## **Unit –4 Problem Solving using Computers**

**(9)**

Problem-Solving, Writing Simple Algorithms, Algorithms Flowcharts, Installation of Software's, Un-installation of Software's , Modules of Windows – Windows Explorer, Control panel, Printer Manager.

### **Reference Books:-**

- 1) Computer Today –Basandara 3<sup>rd</sup> Edition (Unit 1,2)
- 2) Fundamental of computers --V. Rajaraman.(Unit 1,2,3,4)
- 3) Computer Fundamentals --P.K. Sinha. 4<sup>th</sup> Edition (Unit 1,2,3,4)

### **Learning Outcomes:-**

**Unit 1:** Understand the basic concepts of computer hardware and software

Understand the Generations, History and Characteristic of computer system

Identify the applications of computer system with its use

Define the Computer languages and its type

Explain and demonstrate block diagram of Computer system

**Unit 2:** Understand the basic concepts of Input and output devices of computer system

Understand the concepts of Memory and its types

Identify the storage devices and its types

Define the optical disk and CD ROM

**Unit 3:** Understand the basic concepts of Operating System and its types

Understand the concepts of Process managements

Identify the Operating systems types

Define DOS Commands

**Unit 4:** Understand the basic concepts of Problem solving methods using Computer

Understand the concepts of Algorithm and Flowchart

Demonstrate Installation of Software

## **BCSE-102: C Programming – I**

### **Learning Objectives:-**

- i. To Develop a Programming logic.
- ii. To teach basic principles of programming .
- iii. To develop skills for writing programs using 'C'.

## **Unit –1 Introduction to 'C' (9)**

Algorithm, Characteristics, Flowcharts- Definition, Symbol, features, Running and debugging the program., History of 'C' , Character set and keywords , Structure of 'C' programming, Constant and its type, Variable and its Data types in 'C' . , Operators- Arithmetic, logical, relational, bitwise, increment, decrement, conditional, operator precedence.

## **Unit- 2 Input-Output Statements and Control Structures (9)**

Character input-output - getch(), getche(),getchar(),putchar() , String input-output - gets(), puts()  
Formatted input-output - printf(), scanf() , Conditional control statements- if, if else, nested if, elseif ladder, switch ,Looping – for statements, nested for, while, do-while statements, nested while and do while, Infinite loop, Unconditional breaking control statements- break, continue, goto.

## **Unit-3 Arrays (9)**

Array definition and declaration, Single and multidimensional array ,String functions( strcpy(), strcmp(), strcat(), strlen(), strev()).

## **Unit-4 Functions (9)**

Definition, declaration, prototype of function, Local and global variable , User defined functions Storage classes ,Recursion, Call by value and Call by reference ,Preprocessor

### **Reference Books:–**

- 1) ANCI 'C' – E. Balgurusamy (Unit 1,2,3,4)
- 2) Let us C- Y. C. Kanetkar(Unit 1,2)
- 3) 'C' programming- Dennis Ritchie
- 4) Programming in C- Gottfried(Unit 1,2,3,4)
- 5) Programming in 'C'- Venugopal(Unit 1,2,3,4)
- 5) Let Us C – YashwantKanetkar ,BPB Publications, Edition
- 6) Programming in ANSI C , E. Balagurusamy McGraw Hill Education Edition 6
- 7) Programming in C – Schuam outline Series
- 8) The C Programming Language – Brian Kernighan and Dennis Ritchie , Pearson Education India , Edition 2

### **Learning Outcomes:-**

#### **Unit 1:**

- i. Illustrate the flowchart and design an algorithm for a given problem and to develop IC programs using operators

#### **Unit2:**

- i. Develop conditional and unconditional statements to write C program.

#### **Unit3:**

- i. Exercise user defined functions to solve real time problems.

#### **Unit4:**

- i. Understand different concepts of Arrays.

## **BCSE-210: LAB1-COMP**

### **Learning Objectives:**

- i. To understand computer organization, keyboard operations , DOS Commands and Operating System concepts
- ii. To understand programming and its roles in problem solving
- iii. To understand and develop well-structured programs using C language
- iv. To develop programming skills using the fundamentals and basics of C Language.
- v. To teach the student to write algorithms and flowchart of programs in C and to solve the problems.

### **I) Student should Explain**

- 1) Demonstration of peripherals of Computer System.
- 2) Operation of all keys of Keyboard
- 3) Demonstration DOS – external and internal commands, batch files commands
- 4) Windows Operating System – Windows explorer, program manager, control panel, print manager, Creating folders, files, icons, shortcuts
- 5) Write a Program to convert the Temperature in centigrade degree to the Fahrenheit degree.
- 6) IF Then loop and demonstrate whether given number is even or odd.
- 7) Write a program to find out First Fifty Prime numbers.
- 8) Write a program to display Fibonacci series.
- 9) Write a program to reverse the given number.
- 10) Write a program to calculate sum and average of given n numbers using array.
- 11) Write a program to add two Matrices; Use two Dimensional array.
- 12) Write a program to find given string is Palindrome or not using function.

### **Learning Outcomes:-**

- i. Exercise different internal and external DOS commands.
- ii. Understand basic Structure of the C-PROGRAMMING, declaration and usage of variables.
- iii. Explain Use of conditional and iterative statements to Write C programs.
- iv. Explain Use of C programs using arrays.
- v. Explain Use of C programs using functions.

### **Reference Books:**

1. Let Us C – Yashwant Kanetkar ,BPB Publications, Edition 15
2. Programming in ANSI C , E. Balagurusamy McGraw Hill Education Edition 6
3. Programming in C – Schuam outline Series
4. The C Programming Language – Brian Kernighan and Dennis Ritchie , Pearson Education India , Edition 2

## **BCSE- 103: Discrete Mathematical Structure**

### **Learning Objectives:-**

- i. To learn fundamental concepts Counting Principal and Recurrence relation.
- ii. To learn the concepts of Logic and Boolean Algebra
- iii. To learn the principle of Recurrence relation.
- iv. Learn above concepts with Examples.

### **Unit – 1: Counting Principles (12)**

Counting: Addition & Multiplication principle, Permutation and Combination

- Cardinality of finite set.
- Cardinality of union of sets (Addition principle)
- Principle of Inclusion and Exclusion. Examples.

Combinatorial Arguments, Pigeonhole Principle (Statement only). Examples. , Linear Recurrence relation with constant coefficient, Homogeneous solutions, Particular and Total solutions

### **Unit – 2 : Logic (08)**

Propositions and Logical connectives: Definition, Types of Propositions, Truth values and Truth Tables, Tautology and Contradiction, Logical equivalence, Rules of inferences  
Valid arguments and proofs, Methods of Proofs : Direct and indirect Quantifiers

### **UNIT – 3 Boolean algebra (10)**

Hasse digram

Lattice: Definition, principle of duality, Basic properties of algebraic systems defined by Lattices , Distributive and complemented lattices , Boolean lattices and Boolean algebras  
Boolean expressions and Boolean functions, Disjunctive and conjunctive normal forms and examples. , Switching circuit

### **Unit – 4: Recurrence Relations (06)**

Introduction, Linear Recurrence relation with constant coefficient. Homogeneous solutions , Particular and Total solution

### **Reference Books:**

- 1.A Text book of Discrete mathematics by S.R.Patil and others, NIRALI Prakashan  
(Unit- 1,Unit-2, Unit-3, Unit-4)
- 2.Elements of Discrete Mathematics by C.L. Liu
3. Discrete Mathematics by Olympia Nicodemi
4. Discrete Mathematical Structure for Computer Science by Alan Doer and K.Levasicur.
5. Discrete and Combinatorial Mathematics by R.m. Grassl
6. Discrete Mathematics by Kenneth Rosen,Tata McGraw Hill
7. Discrete mathematics by Bhopatkar, Nimbkar, Joglekar, VISION Publication.
8. Discrete mathematics by Naik and Patil, PHADAKE Prakashan

## **Learning Outcomes:**

### **Unit 1:**

- i. Demonstrate mathematical skills, analytical and critical thinking abilities.
- ii. Demonstrate comprehension of discrete structures and their relevance within the context of computer science, in the areas of data structures and algorithms.
- iii. Apply discrete structures into other computing problems such as formal specification, verification, databases, artificial intelligence, and cryptography.

### **Unit 2:**

- i) Apply formal logic proofs or informal, logical reasoning to real problems, such as predicting the behaviour of software or solving problems such as puzzles.
- ii) Communicate clearly and effectively using the technical language of the field correctly.
- iii) Develop a critical appreciation of the use of information and communication technology in mathematics

### **Unit 3:**

- i. Define and evaluate polynomials.
- ii. Write and interpret mathematical notation and mathematical definitions.

### **Unit 4:**

- i. Students will learn: some fundamental mathematical concepts and terminology;; how to use and analyses recursive definitions,
- ii. Student should know how to count some different types of discrete structures, techniques for constructing mathematical proofs mathematical concepts and principles to perform computations.

## **BCSE- 104: COMPUTATIONAL ALGEBRA**

### **Learning Objectives:-**

- i. To learn fundamental concepts Relation and function with an Examples.
- ii. To learn the concepts Divisibility of integers
- iii. To learn the principle of Congruence Equation.
- iv. To learn the concepts of Groups with an examples

### **UNIT – 1 Relation and Functions (12)**

Functions : Definition, Types of mapping , Injective, Surjective & Bijective functions, Inverse function, Composition of functions, Ordered pairs, Cartesian product, Relations, Types of relations, Equivalence relation, Partial ordering, Digraphs of relations, matrix representation and composition of relations, Transitive closure, Warshall's algorithm, Equivalence class, Partition of a set

### **UNIT – 2 Divisibility of integers (9)**

Introduction, Divisibility : Definition and properties, Division algorithm (with proof), Greatest Common Divisor (g.c.d.), Least Common Multiple (L.C.M) ,Euclidean algorithm(Statement only) , Prime numbers, Euclides Lemma, Fundamental theorem of Arithmetic ( without proof)



### **Unit – 3 Congruence Equation (7)**

Congruence relation and its properties, Fermat's Theorem(Statement only). Examples., Euler's theorem, Euler's  $\phi$  function and its properties (Statement only). Examples., Residue Classes: Definition, Examples, addition modulo n multiplication modulo n.

### **UNIT – 4 Groups (8)**

Binary operation : Definition, Definition of multiplication and addition modulo, Residue classes, Semi group and Monoids : Definition and examples , Group : Definition and examples.:-Simple properties of groups, Sub - Group: Definition and examples, Definition of Cyclic group and examples

### **Reference Books:**

1. A Text book of Algebra and Calculus by S.R.Patil and Others Nirali Prakashan. (Unit- 1,Unit-2, Unit-3, Unit-4)
2. Algebra by Bhopatkar, Nimbkar, Joglekar, VISION Publication. (Unit- 1,Unit-2, Unit-3, Unit-4)
- 3 Algebra by Naik and Patil, PHADAKE Prakashan(Unit- 1,Unit-2, Unit-3, Unit-4)

### **Learning Outcomes :**

#### **Unit 1:**

- i. Students will develop and apply concepts of expressions, equations and inequalities to investigate and describe relationships and solve problems.
- ii. Students will understand the basic algebraic functions in terms of fundamental concepts such as rate of change, input or output variables, domain & range, and parameters, and use multiple representations of functions.

#### **Unit2:**

- i. Add, subtract, multiply and divide fractions and real numbers.
- ii. Analyze and demonstrate examples of divisibility of real number.

#### **Unit3:**

- i. Create, use and analyze graphical representations of mathematical relationships.
- ii. Plot ordered pairs, Define properties of real numbers and use them to evaluate algebraic expressions.

#### **Unit4:**

- i. Analyze and demonstrate examples of subgroups, cyclic group.
- ii. Understand the use of parameters and variables, including appropriate replacement sets.

### **BCSE-111: LAB2-MATHS**

#### **Learning Objectives:**

1. To understand Recurrence relation, Switching Circuit
2. To develop skills of different Algorithms with an examples
3. To teach the student to write theorem and its proof with an examples.
4. To teach principles groups with an examples.

I) Student should Explain and verify

1. Recurrence relation with an example
2. Switching Circuit with an example
3. Combinatorial arguments with an example
4. Proofs of valid arguments using laws of inferences.
5. Representation of lattice. With an example
6. Euclid's algorithm, Division algorithm with an example
7. Fermat's theorem on remainder with an example
8. Warshall's algorithm with an example
9. Disjunctive and Conjunctive normal forms of Boolean expression with an example
10. Euler's  $\phi$  function with an example
11. Representation of relation by matrix and diagraph.
12. Construction of group with an example
13. Congruence relation with an example

**Learning Outcomes:**

- i. Understand the foundations of mathematics
- ii. Student will be able to perform basic computations in higher mathematics
- iii. Student will be able to read and understand middle-level proofs.
- iv. Student will be able to write and understand basic proofs
- v. Develop and maintain problem-solving skills
- vi. Use mathematical ideas to model real-world problems
- vii. Acquire a knowledge of the history of mathematics
- viii. Student will be able to communicate mathematical ideas with others

**BCSE- 105: Computational Statistics I**

**Learning Objectives:-**

- i. To learn fundamental concepts of Statistics.
- ii. To learn the concepts of Data Condensation and Graphical Methods
- iii. To learn the principle of Measures of central tendency and Measures of dispersion.
- iv. To learn the concepts Moments with an examples

**Unit-1 Data Condensation and Graphical Methods: (8)**

Definition, importance, scope and limitations of statistics w.r.to computer science. Data Condensation: Raw data, Attributes and variables, discrete and Continuous variables, classification and construction of frequency distribution. ,Graphical Representation: Histogram, Frequency polygon, Frequency curve, Ogive Curves and their uses, Box-Plot. Examples and Problems.

## **Unit-2 Measures of central tendency: (10)**

Concept of central tendency, Criteria for good measures of central tendency., Arithmetic mean: Definition, computation for ungrouped and grouped data, combined mean, weighted mean, merits and demerits., Median: Definition, formula for computation for ungrouped and grouped data, graphical method, merits and demerits., Mode: Definition, formula for computing for ungrouped and grouped data, merits and demerits. , Quantiles: Definition, formula for computation for ungrouped and grouped data, graphical method., Numerical problems.

## **Unit-3 Measures of Dispersion: (10)**

Concept of dispersion and measures of dispersion, absolute and relative measures of dispersion., Range and Quartile Deviation: definition for ungrouped and grouped data and their coefficients, merits and demerits., Mean Deviation: definition for ungrouped and grouped data, minimal property (statement only). , Standard deviation and Variance: definition for ungrouped and grouped data, coefficient of variation, combined variance and s.d. for two groups, merits and demerits. , Numerical problems

## **Unit-4 Moments : (8)**

Raw and central moments: definition for ungrouped and grouped data (only first four moments), relation between central and raw moments ( statement only), Sheppard's Correction., Measures of skewness: Types of skewness, Pearson's and Bowley's coefficient of skewness, Measures of skewness based on moments., Measures of Kurtosis: Types of kurtosis, Measures of kurtosis based on moments., Numerical problems.

## **Reference Books:-**

1. Fundamentals of Statistics by Goon, Gupta, Das Gupta.(Unit-1,2,3,4)
2. Fundamental of Statistics by S. C. Gupta.(Unit-1,2,3,4)
3. Complete Business Statistics by Amir D. Aczel, Jayal Sounderpandian.(Unit-1,2,3,4)
4. Fundamental of Statistics by D. N. Elhance, B. M. Agarwal.(Unit-1,2,3,4)
5. Basic Statistics by B. L. Agarwal.(Unit-1,2,3,4)
6. Statistical Methods by S. P. Gupta.(Unit-1,2,3,4)
7. Fundamental of Mathematical Statistics by Gupta and Kapoor.(Unit-1,2,3,4)

## **Learning Outcomes:**

### **Unit1:**

- i) To construct the data.
- ii) To classify and tabulate the data.
- iii) To summarize large data.
- iv) To demonstrate classified and tabulated data.
- v) To draw and interpreted various graphs and diagrams.

### **Unit2:**

- i) To define mean, median, mode etc.
- ii) To compute and interpret measures of central tendency.
- iii) To analyses and interpreted the data.

**Unit3:**

- i) To define S.D., variance etc.
- ii) To compute and interpret measures of dispersion.
- iii) To analyses and interpreted the data.

**Unit4:**

- i) To define moment, Skewness etc.
- ii) To compute and interpret skewness and kurtosis.
- iii) To analyses and interpreted the data.
- iv) To demonstrate the shape, size and height of data.

**BCSE- 106 : Statistical Methods I****Learning Objectives:-**

- i. To learn fundamental concepts Probability with an examples.
- ii. To learn the Theorems on probability
- iii. To learn the types of probability.
- iv. To learn the concepts of standard discrete probability distributions

**Unit-1 Probability:(9)**

Idea of permutation and combination, concept of experiments and random experiments.,  
 Definitions: sample space, discrete sample space, continuous sample space, events, types of events, power set (sample space consisting at most 3 sample points). ,Illustrative examples.,  
 Classical (apriori) definition of probability of an event, equiprobable sample space, simple examples of probability of an events based on permutations and combinations, axiomatic definition of probability., Theorems on probability: i)  $P(\Phi) = 0$  , ii)  $P(A') = 1 - P(A)$  , iii)  $P(A \cup B) = P(A) + P(B) - P(A \cap B)$  , iv) If  $A \subseteq B$ ,  $P(A) \leq P(B)$  , v)  $0 \leq P(A \cap B) \leq P(A) \leq P(A \cup B) \leq P(A) + P(B)$ , Illustrative examples.

**Unit-2 Conditional probability and independence of events:(10)**

Definition of conditional probability of an event, examples., Partition of sample space,  
 Baye's theorem (only statement), concept of prior and posterior probability and examples.,  
 Concept of independence of two events, examples., Proof of the result that if A and B are independent events then i) A and B', ii) A' and B, iii) A' and B' are also independent.,  
 Pairwise and complete independence of three events, examples.  
 Elementary examples.

**Unit-3 Univariate probability distributions: (9)**

Definitions: discrete random variable, probability mass function (p.m.f.), cumulative distribution function (c.d.f.), properties of c.d.f., median, mode, p.g.f. and examples.,  
 Definition of expectation of a random variable, expectation of a function of random variable, variance. Results on expectation : i)  $E(c) = c$ , where c is constant.ii)  $E(aX + b) = a E(X) + b$ , where a and b are the constants., Examples.

#### **Unit-4 Some standard discrete probability distributions:(8)**

Discrete uniform distribution: p.m.f., mean and variance, examples., Binomial distribution: p.m.f., mean and variance, additive property of binomial variates, recurrence relation for probabilities, examples., Poisson distribution: p.m.f., mean and variance, additive property, recurrence relation for probabilities, Poisson distribution as a limiting case of binomial distribution (without proof), examples.

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

1. Modern Mathematical Statistics by Edward J. Dudewicz, Satya N. Mishra.(Unit-1,2,3)
2. Fundamentals of Statistics by S. C. Gupta.(Unit-1,2,3,4)
3. Complete Business Statistics by Amir D. Aczel, Jayal Sounderpandian.(Unit-1,2,3,4)
4. Fundamental of Statistics by D. N. Elhance, B. M. Agarwal.(Unit-1,2,4)
5. Basic Statistics by B. L. Agarwal.(Unit-1,2,3,4)
6. Statistical Methods by S. P. Gupta.(Unit-1,2,3,4)
7. Fundamental of mathematical statistics by Gupta and Kapoor.(Unit-1,2,3,4)
8. Mathematical Statistics by J.E. Freund.(Unit-1,2,3)

#### **Learning Outcomes:**

##### **Unit1:**

- i) To classify and tabulate the data.
- ii) To define sample space , event, probability etc.
- iii) To compute probabilities by using definition and probability rules.

##### **Unit2:**

- i) To classify and tabulate the data.
- ii) To define probability, conditional probability, independent event etc.
- iii) To compute conditional probabilities by using definition and probability rules.

##### **Unit3:**

- i. To define random variable , p.m.f., distribution function etc.
- ii. To explain mean , median, mode.
- iii. To compute mean , mode, median etc.

##### **Unit4:**

- i) To compute and interpret statistical distributions.
- ii) To draw and interpreted the shape of discrete probability distributions.
- iii) To explain various discrete distributions.
- iv) To analyses and interpreted the data.
- v) To compute probabilities by using discrete probability distributions.
- vi) To fit various statistical distributions.
- vii) To draw and analyses model sample for various distributions.

## **BCSE-112: LAB1-STATS**

### **Learning Objectives:**

- i) To construct the data.
- ii) To Understand the Graphical representation, Measures of central tendency and dispersion
- iii) Student will able to perform computations for Moments of Skewness and Kurtosis
- iv) To Understand the Probability different distributions.

- 1) Construction of frequency distributions.
- 2) Graphical Representation.
- 3) Measures of Central tendency( Ungrouped data).
- 4) Measures of Central tendency( Grouped data).
- 5) Measures of dispersion (Ungrouped data).
- 6) Measures of dispersion (Grouped data).
- 7) Moments , Skewness and Kurtosis (Ungrouped data).
- 8) Moments , Skewness and Kurtosis (Grouped data).
- 9) Computation of probability.
- 10) Computation of Conditional probability.
- 11) Computation of probability on Baye's Theorem.
- 12) Fitting of Binomial distribution.
- 13) Fitting of Poisson distribution.
- 14) Model sampling from Binomial distribution.
- 15) Model sampling from Poisson distribution.

### **Learning Outcomes:**

- i) To construct data.
- ii) To draw and interpreted the graphs and diagrams.
- iii) To analyses and interpreted the data by various statistical techniques.
- iv) To compute probabilities.
- v) To fit various statistical distributions.
- vi) To draw and analyses model sample for various distributions.
- vii) To draw and interpreted the shape of discrete probability distributions.
- viii) To exhibit critical and creative thinking skills for analysis and evaluation of problems.
- ix) To demonstrate MS-Excel.

## **BCSE- 107: Electronic Fundamentals for Computer**

### **Learning objectives:-**

- i. It presents the principle of circuit analysis and design.
- ii. To learn the basic concepts and characteristics of electronic devices and circuits.
- iii. To understand AC sources, DC sources and their concept.
- iv. To verify the theoretical concept through laboratory and simulation experiment.

### **Unit I: Basic Electricals**

**(9)**

AC Sources, Concept of Single Phase, Three phase Power Supplies, RMS Value, Power Calculations, Fuses and protection circuits (MCB), Earthing, Cable (Types of Cables)  
DC Sources, Types of batteries, battery rating, charging.

### **Unit II: Discrete Components in Computer**

**(9)**

Resistor, Capacitor, Inductor

Resistor: Classification, Construction of Carbon Composition Resistor, Color Code, Specification of Resistor.

Capacitor: Classification, Construction of Electrolytic Capacitor only, Specification of Capacitor.

Inductor: Types of Inductor, Uses.

Transformer: Types of transformers, Construction of Step down transformer and its Specifications.

### **Unit-III Theorems**

**(9)**

Ohm's Law, Kirchhoff's Law, Applications of Kirchhoff's Law, Thevenin's theorem, Superposition Theorem, Norton Theorem, Maximum Power Transfer Theorem

### **Unit-IV Types of Motors**

**(9)**

DC Motor, Brushless Motor, Stepper Motor, Servomotor, AC Motor, H- B

### **Reference Books:**

1. A text of Applied Electronics, R. S. Sedha, S Chand Publication (Unit 1 & Unit 2)
2. Basic Electronics and linear circuits: N. N. Bhargava, D. C. Kulshreshtra, S. C. Gupta, Tata McGraw Hill Publication (Unit 1 & Unit 3 )
3. Electronic Devices and Circuits: Boyistead, Tata McGraw Hill ( Unit 1 & Unit 4)
4. Principle of electronics: V.K. Mehta, S. Chand and Company Ltd. 5<sup>th</sup> Edition
  - a. (Unit 1,2,4)

## **Learning outcomes:-**

### **Unit 1:**

- i. Understand the basic concepts of AC and DC Sources.
- ii. Explain the concept of Single phase & three phase power Supplies
- iii. Define the concept of Fuses and protection circuits.
- iv. Design the circuit analysis for power supply.

### **Unit 2:**

- i. Understand the basic discrete Components in Computer.
- ii. Understand the different types of resistors and its construction.
- iii. Understand the different types of Capacitors and its construction.
- iv. Understand the different types of Inductors and its construction.
- v. Explain the concept of types of transformers and its construction.

### **Unit 3:**

- i. Define the Network Theorem.
- ii. Explain the concept of electrical network topology nodes ,branch,loops to solve the circuit problems.
- iii. Verify the Thevenin's theorem and Kirchoff's Law,etc.
- iv. Explain the concept of Ohm's Law

### **Unit 4:**

- i. Explain the basic concept of Motor.
- ii. Define the types of Motors.
- iii. Understand the concept of H-Bridge.
- iv. Demonstrate the DC motor Concept.

## **BCSE- 108: Discrete Electronic for Computers**

### **Learning objectives:-**

- i. To understand the basic electronic components like resistor active and passive component
- ii. To observe the characteristics of diode like p-n junction,zener diode
- iii. To observe the characteristics transistor,thyristor
- iv. To understand the fabrication of electronic component Resistor, Capacitor, etc

### **Unit I: Diodes (9)**

P-N junction Diode, Zener Diode, Schottkey Diode, LED, Photodiode.

### **Unit II: Electronic Devices (9)**

Transistors: BJT, FET, MOSFET, UJT.

Thyristor: SCR, TRIAC, DIAC.

### **Unit III: Audio, Video I/Os (9)**

Bar Chart, Seven Segment Display, Dot Matrix Display, LCD, Optocoupler, Speaker, MIC, Buzzer

### **Unit IV: Fabrication Steps and Materials (9)**

Fabrication of Electronic Components: Resistor, Capacitor, Diode, Transistor (NPN, PNP), P- Channel and N- Channel MOSFET.



**Reference Books:**

1. A text of Applied Electronics, R. S. Sedha, S Chand Publication (Unit 1 & Unit 2)
2. Basic Electronics and linear circuits: N. N. Bhargava, D. C. Kulshreshtra, S. C. Gupta, Tata McGraw Hill Publication (Unit 3 )
3. Electronic Devices and Circuits: Boyistead, Tata McGraw Hill (Unit 1 & Unit 3)
4. Power Electronics, techmax publications by J.S.Katre (Unit 2 & Unit 4)

**Learning outcomes:-****Unit 1:**

- i. Explain the basic concept of semiconductor diode .
- ii. Define P-N Diode and schottkey Diode.
- iii. Explain the Concept of Zener Diode and their characteristics.
- iv. Verify the characteristics of Diodes.

**Unit 2:**

- i. Understand the basic concept of transistors used in computer system.
- ii. Explain the structure of transistors.
- iii. Analyze the concept of SCR and observe its characteristics.
- iv. Analyze and design the basic operation of TRIAC.

**Unit 3:**

- i. Understand the basic concept of bar chart and seven segments Display.
- ii. Define Common anode and common cathode concept.
- iii. Explain the construction of LCD and OptoCoupler.
- iv. Explain the concept of Transducers.

**Unit 4:**

- i. Design and analyze the basic operation of MOSFET.
- ii. Understand the fabrication of basic electronic components.
- iii. Demonstrate resistor fabrication.

**BCSE-113: LAB1-ELECTRONICS****Learning objectives:-**

- i. To understand the basic electronic components like resistor active and passive component
- ii. To verify the different theorems.
- iii. To observe the characteristics of HWR,FWR,PN,FET,UJT etc.
- iv. To understand the PCB Designing Software

1. Study of Electronics components
2. Study of CRO
3. Verification of Kirchoff's Law
4. Verification of Thevenin's Theorem
5. Verification of Norton's Theorem
6. Study of Full wave Rectifier
7. Study of Half wave Rectifier
8. Study of PN junction Diode
9. Study of FET Characteristics
10. Study of Transistor as a switch
11. Study of SCR Firing using UJT
12. Study of PCB Designing using Software
13. Study of Phase shift control of SCR
14. Study of Zener diode as voltage regulator

**Learning outcomes:-**

- i. To identify the basic electronic component
- ii. To study the operations of multi-meter(Analog & digital) ,function generator,regulator power supply and CRO
- iii. To verify Thevenin's Theorem, Norton's Theorem
- iv. To understand and demonstration of PN junction Diode, Zener diode as voltage regulator etc .

## Semester-II

### BCSE-201: Office Automation

#### Learning Objectives:-

- i. To learn fundamental concepts of computers, inputs ,outputs
- ii. To learn the concepts Operating System.
- iii. To learn the principle of Office Automation.
- iv. To learn the problem solving using Computers.

#### Unit – 1 Computer Network Basic Concepts (09)

Basic elements of a communication system – sender, receiver and medium, Data Transmission modes – Simplex, Half Duplex, Full Duplex, Data Transmission Media – wire pairs, Co-axial cable, Microwave System, Communication Satellite, Optical fiber , Definition of networking, Types of networking – LAN, MAN, WAN ,Network Topologies - BUS, Ring, Star, Mesh and Hybrid

#### Unit -2 Office Automation Tools (09)

Study of Word Processors and Spreadsheet :Definition of Word Processor , Detail study of features of MS- WORD, Definition of Spreadsheet, Detail study of features of MS-Excel

#### Unit – 3 Office automation and Database basic concepts (09)

Definition of Field, Record, Database. ,Data Base Management System Concept,( Primary and Foreign key) ,MS-Access Data types, Creating tables, Handling database-using queries., Definition of Power point , Detail study of features of Power point, making a power point presentation, animations.

#### UNIT – 4 IT Management and Internet (09)

Definition of Information Technology, IT Assets and its managements- Data –Access rules , confidentiality of data , Backup procedure., IT Act in brief , Define different terms as mentioned in IT Act – Access, Address , Data , Digital signature , Electronic form , Electronic, Gazette , License , Electronic record , License , Private key, Public key etc. Concept of Internet, Uses and benefits, emails, study websites.

#### Reference Books:-

- 1) Web Publishing- Monica D'Souza & Jude D'Souza (BPB)(Unit 4)
- 2) MS-Office Reference Book(Unit 2)
- 3) Introduction to Computer and Data Processing- Pawar, Lad,Shinde, Patil (Dreamtech) (Unit 1,2,3,4)

#### Learning Outcomes:-

##### Unit1:

- i. Understand the basics concepts of computer networks.
- ii. Study the basics concepts of Network topologies.
- iii. Study the basics concepts of LAN,MAN,WAN

**Unit2:**

- i. Study different Office Automation Tools.
- ii. Study different operations or commands of MSWord
- iii. Study different operations or commands of MSWord

**Unit3:**

- i. Study different basic concepts of database.
- ii. Understand the basic concepts of PK, FK, Data Types, etc.
- iii. Understand the DBMS with Table, Queries , Reports etc.

**Unit4:**

- i. Understand different IT management and Internet concepts.
- ii. Understand different IT Laws

**BCSE-202 : C Programming – II****Learning Objectives:-**

- i. To Develop a Programming logic.
- ii. To teach basic principles of programming.
- iii. To develop skills for writing programs using ‘C’.

**Unit-1 Pointers (09)**

Definition and declaration, Operations on pointer , Pointer initialization , Pointer And Function, Pointer And Array, Pointer of pointer, Dynamic memory allocation

**Unit-2 Structures and Union (09)**

Definition and declaration, Array of structures, Passing structure to function, Pointer to structure , Nested structure, self-referential structure, Sizeof and typedef , Definition of Union and declaration, Difference between structure and Union

**Unit-3 File Handling (09)**

Concept of File ,Text and binary files, Opening and closing files., File opening mode- read, write, append , Character and integer handling ( getc() , putc() , getw() , putw() ) ,Formatted input- scanf(), sscanf(), fscanf(), fread(), Formatted output- printf(), sprintf(), fprintf(), fwrite()

Functions- fseek(), ftell(), fflush(), fclose(), fopen(), rewind()

**Unit-4 Graphics(09)**

Concept of Graphics, Functions to draw shapes – initgraph, getmaxx, getmaxy, outtextxy, circle, closegraph, rectangle, line, arc, rectangle, Functions - setcolor, getcolor, setbkcolor, getbkcolor

**Reference Books:-**

- 1) ANCI 'C' – E. Balgurusamy (Unit 1,2,3,4)
- 2) Let us C- Y. C. Kanetkar (Unit 1,2)
- 3) 'C' programming- Dennis Ritchie
- 4) Programming in C- Gottfried (Unit 1,2,3,4)
- 5) Programming in 'C'- Venugopal (Unit 1,2,3,4)

**Learning Outcomes:-****Unit1:**

- i. Study different basic concepts pointers in C
- ii. Understand the different concepts of operations on Pointers.
- iii. Describe C programs that use Pointers to access arrays and functions.
- iv. Describe C programs using pointers and to allocate memory using dynamic memory management functions.

**Unit2:**

- i) Study different basic concepts array
- ii) Understand the different concepts structure and union.
- iii) Exercise user defined data types including structures and unions to solve problems.

**Unit3:**

- i. Study different basic concepts of File handling in C
- ii. Understand the different functions of File Handling.

**Unit4:**

- i. Study different basic concepts of Graphics in C
- ii. Understand the different functions of Graphics in C.

**BCSE-210: LAB5-COMP****Learning Objectives:**

- i. To understand computer programming and its roles in problem solving
- ii. To understand and develop well-structured programs using C language
- iii. To develop programming skills using the fundamentals and basics of C Language.
- iv. To teach the student to write algorithms and flowchart of programs in C and to solve the problems.
- v. To teach the student MS-Access and its concepts to database management.

1) Student should use MS – WORD and – Creating new documents, typing, deleting, electing text, undo, Redo, formatting text – auto format, formatting characters, drop caps, Paragraphs, line spacing, margins, page setup, headers and footers  
Writer's tools – spelling checker, auto format, auto correct, find and replace Mail merge – Data source, Main document, creating mail merge document.

- 2) Student should use MS – EXCEL - Creating worksheet, Graphs, resizing graphs, formulas, if statement, types of functions.
- 3) Student should use MS ACCESS - Creating data bases , writing queries.
- 4) Student should demonstrate Internet for – creating e–mail accounts, browsing, searching information.
- 5) Student should explain how to create simple Web pages using HTML.
- 6) Student should explain program to reverse string using Pointer.
- 7) Student should demonstrate a program that accepts the Roll No, Name, Marks obtained in three tests of 'N' students & display the total and Average in tabular format.
- 8) Student should Write a program to separate even and odd numbers available in input file.
- 9) Student should Write a program to count the no. of words in a given text file.
- 10) Student should Write a program to draw circle, rectangle using graphics functions.

### **Learning Outcomes:-**

- i. 1 .Exercise MS Word, MS ACCESS and various operations using Internet in detail.
- ii. Create web pages using HTML.
- iii. Write C programs using Pointers to access arrays, strings and functions.
- iv. Write C programs using File functions and Graphics functions.

## **BCSE- 203 : GRAPH THEORY AND ALGORITHMS**

### **Learning Objectives:**

- i. To understand the concepts of Graphs and operations on graphs with an examples
- ii. To understand the concepts of Tree graphs and directed graphs with an examples

### **Unit – 1 : Graphs and operations on graphs (10)**

Definition and elementary results, Types of graphs ,Isomorphism ,Matrix representation of graphs : Adjacency matrix and incidence matrix, Subgraphs and induced graphs  
Complement of a graph, Self complementary graphs, Union, intersection of graphs, Ring sum of two graphs

### **Unit – 2 Connected Graphs (8)**

Definitions: walk, trail, tour, path and circuit, Definitions of connected, disconnected graphs, Dijkstra's shortest path algorithm, Definition of Euler's and Hamilton Graph and Example.

### **Unit-3 : Tree Graphs (8)**

Tree : Definition , 1 Theorem : A tree with n vertices has n -1 edges., 2 Theorem : A connected graph G with n vertices and n – 1, edges is a tree, 3 Theorem : A graph with n vertices is a tree if and only if it is circuit free and has n – 1 edges., 4 Theorem : A graph G is a tree if and only if it is minimally connected., Center of a tree, Spanning tree: Definition and examples, Fundamental circuit and cut – set : Definition, Binary trees and elementary results, Kruskal's algorithm.

#### **Unit - 4 : Directed Graphs (10)**

Definition, types of directed graphs, Directed (rooted) trees, arborescence and Polish notation, Isomorphism of digraphs, Connectedness in digraphs, Euler digraph, Network and flows: Definition, examples., Maximal flow algorithm.

#### **Reference Books:**

1. A Text book of Discrete mathematics by S.R.Patil and others, NIRALI Prakashan (Unit- 1,Unit-2, Unit-3, Unit-4)
2. Elements of Discrete Mathematics by C.L. Liu (Unit-2)
3. Discrete Mathematics by Olympica Nicodemi
4. Discrete Mathematical Structure for Computer Science by Alan Doer and K.Levasicur.
5. Discrete and Combinatorial Mathematics by R.m. Grassl
6. Discrete Mathematics by Kenneth Rosen, Tata McGraw Hill
7. Graph Theory with Applications to Computer Science and Engineering by Narsing Deo, Prentice Hall, India
8. A First Step in Graph Theory by Raghunathan, Nimkar and Solapurkar
9. Discrete mathematics by Bhopatkar, Nimbkar, Joglekar, VISION Publication.
10. Discrete mathematics by Naik and Patil, PHADAKE Prakashan

#### **Learning Outcomes:**

##### **Unit1:**

- i. Student able to formulate problems in terms of graphs, solve graph theoretic problems.
- ii. To understand the concepts of Graph and types of graphs

##### **Unit2:**

- i. Use mathematical definitions to identify and construct examples and to distinguish examples.
- ii. To understand the concepts of problem solving methods using algorithms of graphs

##### **Unit3:**

- i. Solve problems using basic graph theory
- ii. To understand the concepts of

##### **Unit4:**

- iii. Solve problems involving vertex and edge.
- iv. Determine whether graphs are Hamiltonian and/or Eulerian

## BCSE- 204: CALCULUS

### Learning Objectives:

- i. To understand the concepts of Successive differentiation
- ii. To teach the student continuity and Mean value theorem
- iii. To understand Sequences and series of real numbers

### UNIT-1 Successive Differentiation (6)

$n$ th derivatives of some standard functions., Leibnitz's Theorem ( with proof) and examples. L'Hospital's Rule (without proof) and examples

### UNIT-2 Continuity and Mean value Theorems (11)

Continuity of a function and its properties defined on  $[a,b]$ , (Properties without proof) Differentiability. Differentiability implies continuity but not conversely. ,Rolle's theorem(with proof ) and its geometric significance and examples, Lagrange's Mean Value theorem(with proof) and its geometric, significance and examples., Cauchy's Mean Value theorem (with proof) and examples., Taylor's and Maclaurin's Theorems (without proof) Taylor's and Maclaurin's series, Series expansions of  $e^x$ ,  $\sin x$ ,  $\cos x$ ,  $\log(1 + x)$  etc.

### UNIT – 3 Sequences of real numbers (09)

Sequences of real numbers : Definition, examples, Convergent, divergent, oscillatory sequences, Bounded sequence: Definition and examples, Monotonic sequences. Theorems on monotonic and bounded sequences(statements only), Show that sequence  $\langle (1+1/n)^n \rangle$  is convergent and its limit is '  $e$  '. , Convergence of sequence  $\langle x^n \rangle$ , where  $x \in \mathbb{R}$ ,  $0 < x < 1$

### UNIT – 4 Series of real numbers (10)

Partial sums, Converget, Divergent series. Definition and examples, Convergence of geometric series(with proof)., Comparison Test and its limit form (for the series of positive terms), Convergence of  $p$  – series ( without proof)., D'Alembert's Ratio Test (statement only) and examples., Root Test (statement only) and examples.

### Reference Books:

1. A Text book of Algebra and Calculus by S.R.Patil and Others Nirali Prakashan. (Unit- 1,Unit-2, Unit-3, Unit-4)
2. Calculus by Dr. S.B. Nimse (Unit- 1,Unit-2, Unit-3, Unit-4)
3. Mathematical Analysis : Malik and Arrora
4. Real Analysis by R.G. Bartle,D.Sherbert, 3rd Edn, John Wiley & Sons, Indian Edn.
5. Differential Calculus by Shanti Narayan, S.Chand& Co.
6. A text book of Calculus and Differential equations by Dinde H. T. , Lokhande A.D.etc. SUMS publication.



**Learning Outcomes:****Unit1:**

- i. Compute limits, derivatives of algebraic, trigonometric, piece-wise defined functions, logarithmic and exponential functions.

**Unit2:**

- i. Apply the Fundamental Theorem of Calculus.

**Unit3:**

- i. Determine the continuity and differentiability of a function at a point and on a set

**Unit4:**

- i) Define the concepts of sequence and series, and determine limits of sequences and convergence of sequence and series.

**BCSE-211: LAB6-MATHS**

I) Student should explain and verify

1. Kruskal's algorithm with example
2. Dijkstra's Shortest path algorithm with example
3. Fundamental circuit and fundamental cut set with example
4. Polish prefix, Postfix, notations, arborescence with example
5. Ford Fulkerson Algorithm with example
- 6 Program on Ford Fulkerson Algorithm with an example
7. Program on Shortest path Algorithm with an example.
8. Program on Shortest path Algorithm with an example.
9. Rolle's Theorem with an example
10. Lagrange's Mean Value Theorem with an example
11. Cauchy's Mean Value Theorem with an example
12. Series expansion of  $\log(1+x)$ ,  $e^x$ ,  $\sin x$ ,  $\cos x$ ,  $(1+x)^n$
13. L'Hospital's Rule with an example
14. Leibnitz's Rule with an example
15. Convergence of monotonic sequence with an example

**Learning Outcomes:**

- i. 1. Students will be able to model and solve real-world problems using graphs and trees, both quantitatively and qualitatively.
- ii. Apply mathematics to solve problems.
- iii. Solve problems of rounding to the nearest whole number, place of decimal, cent, metre, kilogram etc.
- iv. Apply methods of counting and tallying in practical situations 3. operate a calculator to solve problems

## **BCSE- 205: Computational Statistics II**

### **Learning Objectives:-**

- i. To learn fundamental concepts of Correlation and Regression with an examples.
- ii. To learn the Multiple Regression and Partial Correlation with an examples

### **Unit-1 Correlation (for ungrouped data):(12)**

Concept of bivariate data, scatter diagram. Concept of correlation, positive correlation, negative correlation, cause and effect relation., Karl Pearson's coefficient of correlation, Properties of correlation coefficient, interpretation of correlation coefficient., Spearman's Rank Correlation coefficient ( formula with and without ties)., Numerical problems.

### **Unit-2 Regression (for ungrouped data):(10)**

Concept of regression. Derivation of lines of regression by method of least squares., Regression Coefficients and their significance. Properties of regression coefficients. Point of intersection and acute angle between regression lines (without proof)., Numerical problems.

### **Unit-3 Multiple Regression (For Trivariate Data):(15)**

Concept of multiple regressions. Yule's Notations., Residual: definition, order, properties, mean and variance of residual. , Fitting of multiple regression planes. Partial regression coefficients, interpretations., Numerical Problems.

### **Unit-4 Multiple and Partial Correlation (For Trivariate Data):(12)**

Concept of multiple correlation. Definition of multiple correlation coefficients and its formula., Properties of multiple correlation coefficients (Statements only)., Interpretation of multiple correlation coefficient when it is equal to zero and one., Concept of partial correlation. Definition of partial correlation coefficients and its formula., Properties of partial correlation coefficients (Statement only). , Examples and Problems.

### **Reference Books:-**

1. Fundamentals of Statistics by S. C. Gupta.(Unit-1,2)
2. Complete Business Statistics by Amir D. Aczel, Jayal Sounderpandian.(Unit-1,3)
3. Fundamental of Statistics by D. N. Elhance, B. M. Agarwal.(Unit-1,2)
4. Mathematical Statistics by J.E. Freund.(Unit-1,2)
5. Basic Statistics by B. L. Agarwal.(Unit-1,2)
6. Mathematical Statistics by J. N. Kapur, H. C. Saxena.(Unit-3)
7. Statistics by D. N. Sancheti, V. K. Kapoor.(Unit-1,2,3,4)

### **Unit1:**

- i. To compute relation between two variables.
- ii. To define correlation, types of correlation methods of correlation etc.
- iii. To compute and interpret correlation, methods of correlation etc.
- iv. To analyses and interpreted the data.

**Unit2:**

- i. To compute relation among three variables.
- ii. To define regression, lines of regression etc.
- iii. To fit lines of regression by method of least square
- iv. To analyses and interpreted the data.

**Unit3:**

- i. To define multiple regression.
- ii. To fit plane of multiple of regression.
- iii. To analyses and interpreted the data.

**Unit4:**

- i. To define partial correlation, multiple correlation etc.
- ii. To compute and interpret partial and multiple correlation
- iii. To analyses and interpreted the data.

**BCSE- 206: Statistical Methods II****Learning Objectives:-**

- i. To learn concepts of Continuous Univariate Distributions.
- ii. To learn the Exact sampling distributions with an examples
- iii. To learn the Test of Hypothesis and Simulation with an examples

**Unit-1 Continuous Univariate Distributions:(15)**

Definitions: continuous random variable, probability density function ( p.d.f. ), cumulative distribution function (c.d.f.), properties of c.d.f. , Expectation of random variable, expectation of function of a random variable, variance, m.g.f. and examples.

Uniform distribution: p.d.f., c.d.f., mean, variance and examples. ,Exponential , istribution: p.d.f., c.d.f., mean, variance, lack of memory property and examples., Normal distribution: p.d.f., standard normal distribution, properties of normal curve, distribution of  $aX+bY$ , where X and Y are independent normal variates, normal distribution as a limiting case of Binomial and Poisson distributions (without proof), examples.

**Unit-2 Exact sampling distributions :(12)**

Chi-square distribution: definition, chi-square variate as the sum of square of i.i.d. , S.N.V., statement of p.d.f., mean , variance, additive property, approximation to normal distribution and examples. , Student's t distribution: definition, nature of probability curve, statement of mean and variance, approximation to normal, examples., Snedecor's F- distribution: definition, mean and variance, inter-relationships between chi- square, t and F distributions, examples.

### **Unit-3 Test of Hypothesis:(10)**

Definitions: random samples, parameter, statistic, standard error of a statistic., Concept of null and alternative hypothesis, types of error, critical region, level of significance, one sided and two sided tests, general procedure of testing of hypothesis., Large sample tests: i) population mean ii) equality of population mean iii) population proportion.

Small sample tests: i) test for population variance, Chi-square test for goodness of fit and test for independence of attributes using  $2 \times 2$  contingency table.

ii) t-test for testing population mean, equality of population mean and Paired t-test.

iii) F-test for equality of two population variances.,

Examples.

### **Unit-4 Simulation :(8)**

Introduction to simulation, merits and demerits., Pseudo-random number generator, model sampling from uniform and exponential distribution., Model sampling from normal distribution using Box-Muller transformation., Examples.

### **Reference Books:-**

1. Fundamentals of Statistics by S. C. Gupta.(Unit-3)
2. Modern Mathematical Statistics by Edward J. Dudewicz, Satya N. Mishra. (Unit-1,3)
3. Fundamental of Statistics by D. N. Elhance, B. M. Agarwal.(Unit-3)
4. Mathematical Statistics by J.E. Freund.(Unit-3)
5. Basic Statistics by B. L. Agarwal.(Unit-1,2,3)
6. Fundamental of Statistics by Gupta and Kapoor.(Unit-1,2,3)
7. Statistics by V. K. Kapoor.(Unit-1,2,3)

### **Learning outcomes:**

#### **Unit1:**

- i. To define continuous random variable , p.d.f., distribution function etc.
- ii. To compute and interpret statistical distributions.
- iii. To draw and interpreted the shape of continuous probability distributions.
- iv. To explain various continuous distributions.
- v. To analyses and interpreted the data.
- vi. To compute probabilities by using continuous probability distributions.
- vii. To fit various statistical distributions.
- viii. To draw and analyses model sample for various distributions.

#### **Unit2:**

- i. To compute and interpret statistical distributions.
- ii. To draw and interpreted the shape of continuous probability distributions.
- iii. To explain various continuous distributions.
- iv. To analyses and interpreted the data.
- v. To compute probabilities by using continuous probability distributions.
- vi. To fit various statistical distributions.
- vii. To draw and analyses model sample for various distributions.

viii. To draw and interpreted the shape of continuous probability distributions

**Unit3:**

- i. To define statistic, parameter, test statistic etc.
- ii. To explain procedure of testing of hypothesis.
- iii. To explain the small sample and large sample tests in various situations
- iv. To compute the small sample and large sample tests in various situations

**Unit4:**

- i. To analyses and interpreted the data.
- ii. To fit various statistical distributions.
- iii. To draw and analyses model sample for various distributions.
- iv. To Simulation study of various distributions.

**BCSE-212: LAB7-STATS**

**Learning Objectives:**

- i) To understand the Computation of correlation, Fitting of different distribution
- ii) To understand the Computation of partial correlation coefficients
- iii) To verify different Model sampling
- iv) To understand Computation on different tests

- 1) Computation of correlation coefficient and scatter diagram.
- 2) Fitting of lines of regression (Ungrouped data).
- 3) Fitting of regression planes and estimation.
- 4) Computation of partial correlation coefficients.
- 5) Computation of multiple correlation coefficients.
- 6) Fitting of Uniform distribution.
- 7) Fitting of Exponential distribution.
- 8) Fitting of Normal distribution.
- 9) Model sampling from Normal distribution using:
  - i) Normal table and ii) Box- Muller transformation.
- 10) Model sampling from Uniform distribution.
- 11) Model sampling from Exponential distribution.
- 12) Computation on Large sample test, Chi-square test
- 13) Computation on t-test, F-test.

**Learning Outcomes:**

- i) To compute relation between two and three variables.
- ii) To fit simple and multiple regression equations.
- iii) To draw and interpreted the graph of bivariate data.
- iv) To compute and interpret data by statistical techniques.
- v) To demonstrate bivariate and multivariate data.
- vi) To know the relations among the different distributions with real life situations.
- vii) To compute probabilities by using continuous probability distributions.
- viii) To measure and analyses the data by various statistical techniques.
- ix) To draw and interpreted the shape of continuous probability distributions.
- x) To explain various continuous distributions, statistical distributions and model sample

## **BCSE- 207: Electronic Circuit for Computer**

### **Learning objectives:-**

- i. It presents the principle of circuit analysis and design.
- ii. To learn the basic concepts and characteristics of electronic devices and circuits.
- iii. To analyze transistor amplifier their frequency response
- iv. To verify the theoretical concept through laboratory and simulation experiment

### **Unit I- Rectifier Circuits**

**(9)**

Filters, Regulator (Zener and Positive Voltage Regulator, Negative Voltage Regulator), IC 7805, IC 7905, LM 317.

### **Unit II- Transistor Amplifiers**

**(9)**

CE, CB, CC Amplifier, Transistor as Buffer, Transistor as Switch, MOSFET Amplifier.

### **Unit III- FET as VVR**

**(9)**

UJT as Sweep Generator, Transistor Oscillator, Crystal Oscillator

### **Unit IV- Multivibrators**

**(9)**

Transistor as Astable, Bistable and Monostable Multivibrator

### **Reference Books:**

1. Electronic Device and Circuit by Rama Reddy, Narosa publication Delhi (Unit 3 & a. Unit 4)
2. A text book of Applied Electronic by R. S. Sedha, S Chand publication (Unit 1 & Unit 2)
3. Principle of electronics: V.K. Mehta, S. Chand and Company Ltd. 5<sup>th</sup> Edition (Unit 1,2,3)
4. Power Electronics, techmax publications by J.S.Katre (Unit 2 & Unit 4)

### **Learning outcomes:-**

#### **Unit 1:**

- i. Understand the concept of rectifier circuits.
- ii. Demonstrate the positive and negative voltage regulator.
- iii. Define the concept of Filters.

#### **Unit 2:**

- i. Explain the concept of Amplifier.
- ii. Understand the concept of CE, CB, CC amplifier.
- iii. Define Transistor as a Switch and Transistor as a buffer.
- iv. Define the concept of MOSFET amplifier.

#### **Unit 3:**

- i) Define the concept of VVR.
- ii) Explain UJT as sweep generator.
- iii) Understand the types of Oscillator.
- iv) Demonstrate Crystal Oscillator.

**Unit 4:**

- i) Explain basic concept of Multivibrator.
- ii) Demonstrate Transistor as Astable Multivibrator.
- iii) Define the concept of Monostable Multivibrator.
- iv) Verify the duty Cycle for Astable Multivibrator

**BCSE- 208: Digital Fundamental for Computer****Learning objectives:-**

- i. To understand number representation and conversion between different representation in digital electronics circuit
- ii. To analyze logic processes and implement logical operation using combinational logic circuit
- iii. To understand concept of sequential circuit and to analyze sequential system in terms of state machines
- iv. To implement the combinational and sequential circuit

**UNIT I: Number System AND Binary Codes (9)**

Binary, Octal, Hexadecimal Number system' Interconversion from one system to Another, BCD code, Gray code, Excess-3 code, ASCII code, Concept of parity. Signed and unsigned numbers, 1's complement and 2's complement of binary numbers and binary arithmetic.

**UNIT II: Logic Gates (9)**

Logic gates-AND, OR, NOT, NOR, NAND EX-OR (Symbol, Expression and Truth Table) Boolean algebra and identities; De Morgan's theorem and Interconversion of logic Gates; Simplifications of logic expressions using a) Boolean algebra), K-map. Introduction to logic families: TTL NAND gate, input output parameters, tristate logic, Fan in; fan out, propagation delay, noise margin.

**UNIT III: Combinational Circuits (9)**

Half adder, Full adder, half subtractor, Parallel adder, nibbles Adder; Arithmetic logic unit, Encoder, Decoder, Multiplexer, and Demultiplexer, concept of analog multiplexer. Pin Configuration of 74153, 74156, 7447, 74138.

**UNIT IV: Sequential circuits (9)**

Concept of sequential circuits; Latch, Flip-flops: RS, Clocked RS, JK, Master Slave JK, Counter-synchronous, asynchronous, up-down counter, modulo-N counter

**Reference Books:**

1. Digital Principles and applications- Malvino Leach, Tata McGraw Hill, 4<sup>th</sup> Edition ( Unit 1)
2. Digital Electronics C.F.strahglo ( Unit 1 & Unit 2)
3. Digital logic and Computer Design:Morris Mono.( Unit 3 & Unit 4)
4. Fundamental computers-V.Rajaraman ( Unit 1 & Unit 2)

## **Learning Objectives:**

### **Unit 1:**

- i) Understand the concept of Binary Number system used in computer.
- ii) Understand the inter conversion from one number system to another number system.
- iii) Define the concept of ASCII code, gray code, etc.
- iv) Explain the concept of parity.

### **Unit 2:**

- i) Understand the basic concept of Logic Gates.
- ii) Verify the De Morgans theorem.
- iii) Explain the concept of K-Map.
- iv) Define the logic families and its characteristics.

### **Unit 3:**

- i) Analyze Logic processes and implement logical operations using Combinational logic circuits.
- ii) Explain the concept of Adder.
- iii) Demonstrate the Half adder.
- iv) Define the concept of Analog Multiplexer.

### **Unit 4:**

- i) Define and implement Sequential Logic Circuits.
- ii) Explain the concept of Flip/Flop .
- iii) Understand the Concept of Counter.

## **BCSE-213: LAB8-ELECTRONICS**

### **Learning Objectives:**

- i) To understand the use of Voltage Regulator
- ii) To understand the concept of multivibrator
- iii) To use different adder and multiplexer
- iv) To Understand Counter and De-multiplexer

1. Positive Voltage Regulator using Three pin IC 7805
2. Negative Voltage Regulator using Three pin IC 7905
3. FET as VVR
4. Study of Astable/ bistable/ monostable multivibrator, Crystal Oscillator
5. Study of Logic Gate
6. Verification of De-Morgans Theorem
7. Universal gate using NAND gate
8. Universal gate using NOR gate
9. Study of Full / Half Adder
10. Study of Half Adder, Multiplexer, Flip-Flop, Counter, De-multiplexer



**Learning outcomes:-**

- i. To study the basic logic gates, combinational and sequential circuits
- ii. To study the operations of multi-meter (Analog & digital), function generator, regulator power supply and CRO
- iii. To verify De-Morgan's Theorem
- iv. To understand and demonstration of analog and digital experiment