



Shri Sangameshwar Education Society's
Sangameshwar College, Solapur [Autonomous]
 (Affiliated to Punyshlok Ahilyadevi Holkar Solapur University, Solapur)

Kannada Linguistic Minority Institute
 NAAC Accredited with 'A' Grade (III Cycle CGPA 3.39)

Table-1

Sangameshwar College, Solapur [Autonomous]
 Structure of Choice Based Credit System for Undergraduate Science Programme B.C.A
 . To be implemented from A.Y. 2020-2021

Semester	Course		Teaching Scheme/week		
			Hours	Lectures	Credits
I	AECC-A	English Communication-I	3.2	4	2
	DSC-1A	Fundamentals of Computer Logic Development with C Programming	4	5	4
		Practical-I	3.2	4	2
	DSC-2A	Web Programming – I	4	5	4
		Software Engineering- I	3.2	4	2
	DSC-3A	Discrete Mathematics	4	5	4
		Statistical Methods-I	3.2	4	2
	DSC-4A	Digital Electronics	4	5	4
		Operating System –I	3.2	4	2
	Total		32	40	26
II	AECC-B	English Communication-II	3.2	4	2
	DSC-1B	Office Automation	4	5	4
		Advanced Programming in C	3.2	4	2
	DSC-2B	Web Programming – II	4	5	4
		Software Engineering- II	3.2	4	2
	DSC-3B	Graph Theory	4	5	4
		Statistical Methods-II	3.2	4	2
	DSC-4B	Microprocessor	4	5	4
		Operating System-II	3.2	4	2
	Democracy, Elections and Good Governance		2.4	3	--
Total		32+2.4	40+3	26	
Total Semester I and II					52

Table-2

Sangameshwar College, Solapur [Autonomous]
 Structure of Examination Mark Scheme of C.B.C.S. for Undergraduate Science Programme
 B.C.A. To be implemented from A.Y. 2020- 2021

Semester	Course		EXAMINATION			Credits
			Marks			
			CA	SE	Total	
I	AECC-A	English Communication-I	10	40	50	2
	DSC-1A	Fundamentals of Computer	10	40	50	2
		Logic Development With 'C' Programming	10	40	50	2
	DSC-2A	Web Programming – I	10	40	50	2
		Software Engineering- I	10	40	50	2
	DSC-3A	Discrete Mathematics	10	40	50	2
		Statistical Methods-I	10	40	50	2
	DSC-4A	Digital Electronics	10	40	50	2
Operating System -I		10	40	50	2	
	Total		90	360	450	18
II	AECC-B	English Communication-II	10	40	50	2
	DSC-1B	Office Automation	10	40	50	2
		Advanced Programming in C	10	40	50	2
	DSC-2B	Web Programming – II	10	40	50	2
		Software Engineering- II	10	40	50	2
	DSC-3B	Graph Theory	10	40	50	2
		Statistical Methods-II	10	40	50	2
	DSC-4B	Microprocessor	10	40	50	2
		Operating System-II	10	40	50	2
	DSC-1A &DSC-1B	Practical-I	20	80	100	4
	DSC-2A & DSC-2B	Practical-I	20	80	100	4
	DSC-3A & DSC-3B	Practical-I	20	80	100	4
	DSC-4A &DSC-4B	Practical-I	20	80	100	4
		Democracy, Elections and Good Governance	10	40	50	--
	Total	170+10	680+40	850+50	34	
Total Semester I and II			260+10	1040+40	1300+50	52

CA : Continuous Assessment SE: Semester End

DSC-1A Theory-I Title: Fundamentals of Computer		Hours 30
Unit 1	<p>Computer Fundamentals: Introduction to computer and Characteristics of Computer, Concepts of hardware and software, Evolution of computer and Generations, Classification and types of computers, Applications of computers in various fields.</p> <p>Block diagram of computer: Input unit, CPU- ALU, Memory unit and control unit, output unit, Introduction to- Motherboard, SMPS, Math Coprocessor, Expansion slots, Serial and parallel ports, Data and Control Bus.</p>	7
Unit 2	<p>Computer Peripherals : Memory Concepts- Types of Memory/Storage Devices Primary - RAM, ROM, EPROM, EEPROM, Secondary- Magnetic Tape, Magnetic Disk (Floppy disk and Hard Disk), Compact Disk, USB.</p> <p>Input/ Output Devices: Input Devices- Keyboard , Mouse, Light pen , Joystick, Scanner, MICR, OMR, Bar Code reader, Digitizer, Touch Screen. Output Devices -VDU , Printers- Dot Matrix, Ink Jet Laser, Plotters, Speakers. Speech synthesizer.</p>	8
Unit 3	<p>Introduction to Computer Language and Software : Computer languages - Machine Language, Assembly language, High Level language, Basics of Translator (compiler, assembler, interpreter).</p> <p>Software - System and Application software, Operating system- Introduction, Evolution of operating system, Types of operating system.</p>	7
Unit 4	<p>Computer Communication and Networks: Concepts of computer communication, Computer network - LAN, WAN, MAN. Network Topologies, Communication Channels Protocols, Introduction to Internet, Browsers, Overview of modem, Bluetooth and router device Buying & selling products over the internet, Introduction of E-Mail, Introduction to Search Engines.</p>	8
<p>Course Outcome: Student can learn</p> <ol style="list-style-type: none"> 1) Basics of an operating systems, programming languages, peripheral devices & networking, Installation configure, and remove software and hardware. 2) Detail introduction about computer Languages 3) Computer systems technical specifications 		

DSC-1A Theory-II Title: Logic Development With ‘C’ Programming		Hours 30
Unit 1	<p>Introduction To Programming: Introduction To Algorithm- Definition, Characteristics or features of algorithm, Examples of algorithm to solve problem</p> <p>Flow Chart: Definition, characteristics or features of flowchart, symbols used in flowchart, Examples on Flow Charts</p> <p>Logic: Definition, Types- Sequence Logic, Selection Logic, Iteration Logic</p> <p>Pseudo Code: Definition, characteristics or features of pseudo code, Examples of Pseudo Code</p>	7
Unit 2	<p>Introduction To C: History and Features of C, Structure of C, Compilation and Execution of C, Keywords, Identifiers, Data Types- Primitive, Derived, User defined, Variables, Constants, #define</p> <p>Input / Output Functions: scanf(), printf(), getch(), getchar(), putchar(), getche()</p> <p>Operators in C: Arithmetic, logical, assignment, relational, bitwise, unary, sizeof, ternary</p> <p>Type Casting, typedef & enum</p>	8
Unit 3	<p>Control Structure: Decision Control Structure- simple if, if else, nested if, if else ladder, switch, switch vs if else</p> <p>Loop Control Structure- while, do while, for, nesting of loop</p> <p>Unconditional Branching Statement- break, continue, goto</p>	7
Unit 4	<p>Arrays: Introduction & definition of array, Types of array- One Dimensional, Two Dimensional, Multi-Dimensional</p> <p>String: Introduction To string, String Manipulation, String Handling Function, Two Dimensional Array of Characters</p>	8
<p>Course Outcome:</p> <ol style="list-style-type: none"> 1. To develop problem solving concepts. 2. Understand operators, expressions and preprocessors. 3. Develop conditional statements to write programs in C. 4. Understand concept of an array, it's declaration and uses. 		

DSC-2A Theory-I Title: Web Programming – I		Hours 30
Unit 1	Overview of HTML Introduction to web technology, Introduction to internet, Requirement of Internet, Introduction to HTML, structure of HTML, creating and opening of HTML file, Tags-Singular and paired tags, text formatting tags, Anchor Tags, List, Image, Image mapping, table, Frames and frameset.	8
Unit 2	Introduction to HTML5 : Introduction to HTML5, Need of HTML5,DOCTYPE element, Tags- Header, Section, Article, Nav, Footer, Figure, Aside, Input tags in HTML5 (Placeholder, Autofocus, Required , attributes),Graphics in HTML5,Media Tags in HTML5	8
Unit 3	Basics of CSS Introduction to CSS, Use of CSS, Advantages of CSS, Types of CSS, Types of selectors, Properties-Background, Border, Text, Font, Margin, Padding, Box Model, Link, Lists, Table, Opacity, Floating.	7
Unit 4	Advance in CSS : Animation, Multiple column layout, User Interface, 2D/3D transformation, overflow, Display, Positioning, Media Type, Values Replaced content, CSS-Rounded corners, Multiple backgrounds, User Interface.	7
Course Outcome: Design and development of web-pages. They are able to design static web pages by using HTML and CSS.		

DSC-2A Theory-II Title: Software Engineering- I		Hours 30
Unit 1	System concepts - Definition of system, Elements of system, System concepts, Types of system, System Analysis and Role of System Analyst	7
Unit 2	Software Engineering- Definition of software engineering, Characteristics of software, Qualities of software, Types of Software	7
Unit 3	System Development life cycle- What is the System Development life cycle? SDLC Models- Classical model, Spiral model, Waterfall model, Prototyping Model, V shape Model, RAD model	8
Unit 4	Fact finding techniques - Need of fact finding techniques Fact finding techniques- Interviews, Questionnaire, Record reviews, Observation Requirements - Basic and User design requirements, Organization Dependant Requirements	8
<p>Course Outcome: After completion of the course students will understand the following</p> <ol style="list-style-type: none"> 1)They will be able to know the meaning of software engineering and documentation required in software development 2)Types of techniques to collect the required data for development of the software 3)Different stages and models in software engineering 		

DSC-3A Theory-I Title: Discrete Mathematics		Hours 30
Unit 1	Definition, order, types of matrices, transpose of a matrix, inverse of a matrix by using adjoint method. Algebra of matrices: addition, subtraction, scalar multiplication, matrix multiplication. Introduction to Sets, Finite and Infinite Sets, Unaccountably Infinite Sets, Pigeonhole Principle, Principle of Inclusion and Exclusion	8
Unit 2	Relation:: Definition, types of relation: identity, reflexive, symmetric, equivalence, antisymmetric, partial orderings, asymmetric. Diagraph of relations, Matrix representation of relation, in degree out degree of a vertex, transitive closure, Warshall's algorithm. -	8
Unit 3	Function: Definition of function as relation, injective, surjective & bijective function. Inverse function. Composition of function.	7
Unit 4	Propositional Calculus: Proposition- Simple statement, Compound statement, Logical connectives, Disjunction, Conjunction, Negation, Implication, Double Implication, Converse, inverse and contra positive of conditional statement, Truth tables, tautology, Contradiction & neither, commutative laws, associative, Laws, distributive laws, Demorgan's laws, logical equivalence.	7
Course Outcome: <ol style="list-style-type: none"> 1. Students completing this course will be able to express a logic sentence in terms of predicates, quantifiers, and logical connectives. 2. Students completing this course will be able to evaluate Inverse functions 		

DSC-3A Theory-II Title: Statistical Methods-I		Hours 30
Unit-I	<p>Population and Sample: Concept of Statistical population with illustration, Concept of Sample with illustration, Methods of sampling - SRSWR, SRSWOR, Stratified, Systematic (description only) Data condensation and Graphical methods: Raw data, Attribute, Variables, Discrete and Continuous Variable, General principles of classification of raw data, Construction of frequency dist, Cumulative frequency dist, Graphical representation of frequency dist- Histogram, Ogives, Numerical problems.</p>	8
Unit-II	<p>Measures of Central Tendency: Concept of Central Tendency, Objects of Central Tendency, Criteria for good Measures of Central Tendency, A.M. – def., formula for computation for ungrouped & grouped data, combined A.M., effect of change of origin & scale, merits & demerits, Median- def., formula for computation for ungrouped & grouped data, graphical methods, merits & demerits, Mode- def., formula for computation for ungrouped & grouped data, graphical methods, merits & demerits, Empirical Relation between mean ,mode & median, Numerical Problems.</p>	7
Unit-III	<p>Measures of dispersion: Concept of dispersion, Absolute & Relative measures of dispersion, Range- def., formula for computation for ungrouped & grouped data, coeff. of range, merits & demerits, Variance & S.D.- def., formula for computation for ungrouped & grouped data, combined variance, C.V., effect of change of origin & scale, merits & demerits, Numerical problems</p>	7
Unit-IV	<p>Correlation Bivariate data, scattered diagram. Concept of correlation, types of correlation, cause & effect Relation. Karl Pearson’s coeff. of correlation (r), limit of r ($-1 \leq r \leq 1$) Interpretation of r, basic assumptions on which r is based. Numerical problems. Regression for ungrouped data-Concept of regression, Derivation of lines of regression by least square principle. Properties of regression coeff. Numerical problems.</p>	8
<p>Course Outcome:</p> <ol style="list-style-type: none"> 1. Students will get Practical Knowledge of Statistics 2. Students will come know application of statistical tools 3. Student will study Enhancement of computational ability and logical skills 		

DSC-4A Theory-I Title: Digital Electronics		Hours 30
Unit 1	Number Systems and Arithmetic Contents :Decimal Number System & Binary Number System Decimal to Binary conversion (Double-dabble method only), Binary to Decimal Conversion, Decimal to Binary conversion (Double-dabble method only),Hexadecimal number system , Hexadecimal to binary, binary to Hexadecimal, Hexadecimal to decimal conversion , Binary Arithmetic : Binary addition, subtraction, multiplication & division ,Binary subtraction using 1' complement, 2's complement method	7
Unit 2	Logic Gates and Boolean Algebra Contents :Logic Gates : AND, OR, NOT, NAND ,NOR ,Ex-OR, Ex-NOR , De Morgan's theorems, Universal building block, Postulates of Boolean Algebra, Reducing Boolean expressions ,Logic diagrams of Boolean expressions , SOP,POS (Minterms and Maxterms), K-Map, K-map for 2 variables K-map for 3 variables K-map for 4 variables minimization of boolean expression using K-Map.	8
Unit 3	Combinational Digital circuit design Contents :Half Adder & Full Adder , Binary parallel Adder, Half Subtractor, Full Subtractor, Multiplexer and Demultiplexer, encoders and decoders, pin function of IC 74150,74154, 74138,74148	7
Unit 4	Sequential Digital circuit design Contents Concept of flip-flop, types of F/F, RS F/F, Clocked RS F/F, D F/F Triggering (positive , negative), preset and clear F/F, JK F/F , T F/F , Race around condition of JK F/F, Master slave JK F/F ,Introduction to counter, types of counters-synchronous, Asynchronous,3-bit up counter, down counter, Ring counter, pin configuration of IC 7490 ,Introduction register, types of shift register: Serial- in serial –out(left shift register, right shift register), Serial-in parallel-out , Parallel-in serial-out, parallel-in parallel-out, pin configuration of IC 7495	8
<p>Course Outcome: After successful completion of the course student will be able to,</p> <ol style="list-style-type: none"> 1. Convert different types of codes and number systems which are used in digital communication and computer systems. 2. Employ the codes and number systems converting circuits and Compare different types of logic families which are the basic unit of different types of logic gates in the domain of performance and efficiency. 3. Design and analyze circuits for digital arithmetic. 4. Draw a circuit diagram for a sequential logic circuit and analyze its timing properties 		

DSC-4A Theory-II Title: Operating System –I		Hours 30
Unit 1	Introduction What is mean by O.S.? ,Types of O.S. (Batch, Parallel, Multiprogramming, Time Sharing, Distributed, Real time) Structure of O.S ,System Components, Services provided by O.S, Monolithic and Layered Systems ,System design and implementation ,System Generalization and virtual machine	8
Unit 2	Process Management Concepts of Process ,Process life cycle ,Process states System calls ,Operations on Process, Cooperating Process and threads ,Interprocess Communication ,Process Scheduling: concept, criteria	7
Unit 3	Process Scheduling Algorithms: FCFS (First Come First Serve), SJF (Shortest Job First), Round Robin, Priority Scheduling, Multilevel Queue Scheduling.	8
Unit 4	Process Synchronization : Critical section problem, Semaphores ,Critical Regions Classic Problems of Synchronization - Bounded Buffer (Producer-Consumer) Problem, Dining Philosophers Problem, The Readers Writers Problem	7
Course Outcome:		
<ol style="list-style-type: none"> 1. Students will be able to understand the structure, components and functions of the operating system. 2. They can get information about processes in the operating system and CPU scheduling algorithms. 3. Students will be able to understand the concept of synchronization and their problems. 		

DSC-1B Theory-I Title: Office Automation		Hours 30
Unit 1	<p>Introduction to Computer: Applications of Computer , Advantages of Computer, Terms related to Computer, Characteristics of Computer: Speed, Storage, Versatility and Diligence, Hardware & Software.</p> <p>Windows: Desktop icons and their functions: My computer, My documents, Network neighborhood, Recycle Bin, Quick launch toolbar, System tray, Start menu, Task bar, Dialog Boxes: List Box, Spin Control Box, Slide, Drop-down list, Radio button, Check box, Text box, Maximize, Minimize, close and Resize & Moving a Window, Keyboard Accelerators: Keyboard short keys or hotkeys.</p>	7
Unit 2	<p>MS Word: File :Working with Documents -Opening & Saving files, Editing text documents, Converting files to different formats, Importing & Exporting documents, Sending files to others, Using Toolbars, Ruler Home: Text Formatting, Find, Search, Replace, Formatting Documents: Setting Font styles, Font selection- style, size, colour etc, Typeface, Case settings, Highlighting, Setting Paragraph style, Alignments, Indents, Line Space, Margins, Bullets & Numbering. Insert : Header & footer, Setting Footnotes & endnotes – Shortcut Keys; Inserting manual page break, Column break and line break, Setting Document styles, Page Numbering, date & Time, Author etc., Creating Tables: Table settings, Borders, Alignments, Insertion, deletion, Merging, Splitting, Sorting, and Formula. Inserting Clip Arts, Pictures/Files. Page Layout : Formatting page & setting Margins, Using Icons, using help. Special symbols, Setting Page style: Formatting Page, Page tab, Margins, Layout settings, Paper tray, Border & Shading, Columns Creating Master Documents, Web page. Tools: Word Completion, Spell Checks, Mail merge, Templates, Changes, Security, Digital Signature.</p>	8
Unit 3	<p>MS Excel: Spread Sheet & its Applications, Menus - main menu, Formula Editing, Formatting, Toolbars, Using Icons, Using help, Shortcuts, Spreadsheet types. Working with Spreadsheets, Converting files to different formats (importing, exporting, sending files to others), Spreadsheet addressing. Entering & Deleting Data in Spreadsheets, Highlighting values, Find, Search & replace, Inserting Data, Insert Symbols, Data from external files, Frames, Clipart, Pictures, Files etc, Manual breaks. Setting Formula: finding total in a column or row, Mathematical operations (Addition, Subtraction, Multiplication, Division, Exponentiation), using other Formula. Formatting Spreadsheets: Labelling columns & rows, Formatting- Font, Border & Shading, Hiding/ Locking Cells, Anchoring objects, Formatting layout for Graphics, Clipart etc., Worksheet Row & Column Headers, Sheet Name, Row height & Column width, Visibility - Row, Column, Sheet, Security, Sheet Formatting & style, Sheet background, Colour etc, Borders & Shading – Shortcut keys. Working with sheets: Sorting, Filtering, Validation, Consolidation, and Subtotal. Creating Charts: Drawing. Printing. Using Tools – Error checking, Formula Auditing, Creating & Using Templates, Pivot Tables, Tracking Changes, Security, Customization.</p>	8

Unit 4	<p>MS Power point:</p> <p>Presentation – Opening new presentation, Different presentation templates, setting backgrounds, selecting presentation layouts.</p> <p>Creating a presentation: Setting Presentation style, Adding text to the Presentation.</p> <p>Formatting a Presentation: Adding style, Colour, gradient fills, Arranging objects, Adding Header & Footer, Slide Background, Slide layout. Adding Graphics to the Presentation- Inserting pictures, movies, tables etc into presentation, Drawing Pictures using draw.</p> <p>Adding Effects to the Presentation: Setting Animation & transition effect. Printing Handouts, Generating, Standalone Presentation viewer.</p> <p>MS Access: Introduction, Planning a Database, Starting Access, Access Screen, Creating a New Database, Creating Tables, Working with Forms, Creating queries, Finding Information in Databases, Creating Reports, Types of Reports, Printing & Print Preview – Importing data from other databases viz. MS Excel etc.</p>	7
<p>Course Outcome:</p> <ol style="list-style-type: none"> 1) It will help to learn computer functionalities from basics to advance 2) students would be able to document spreadsheets, make small presentations 3) To develop future managers for offices and software awareness using office Automation. 		

DSC-1B Theory-II Title :Advanced Programming in C		Hours 30
Unit 1	<p>Functions: Introduction & definition of function, Need or use of function, Types of Functions: Library functions, User defined function. Function Prototyping</p> <p>Types of Functions: Function with argument without return value, Function with argument with return value, Function without argument with return value, Function without argument without return value, Nesting of Function, Recursion, Make your own libraries</p> <p>Storage Class: Automatic Storage Class, External Storage Class, Static Storage Class, Register Storage Class</p>	8
Unit 2	<p>Pointers Definition and declaration, Operation on pointer, Pointer Arithmetic</p> <p>Types of Pointer: Dangling, Void , Null and Wild Pointers Pointer and array, Pointer of pointer, Call by value and Call by reference, Pointer To Function</p> <p>Dynamic Memory Allocation Dynamic Memory Allocation Concept: malloc(), calloc(), free(), realloc()</p>	8
Unit 3	<p>Structure and Union Definition and declaration, Array inside structure, Array of structure, Passing structure to function , Pointer to structure ,Nested structure, self referential structure, Sizeof operator</p>	7
Unit 4	<p>File Handling Declaring, Opening and Closing File, Different modes of the file, Manipulating character based file: fgetc() and fputc(). Manipulating integer based file: getw() and putw(). Manipulating string based file: fgets() and fputs(). Formatted I/O functions: fscanf(), fprintf().</p> <p>Binary file handling: fread() & fwrite(), Random file access</p> <p>Macros and Preprocessing-Features of C Preprocessor, Macro-Declaration, Expansion, File inclusion</p> <p>Introduction To Graphics Introduction, line(), rectangle(), circle(), outtextxy(), setfillstyle(), setcolor(), kbhit()</p>	7
<p>Course Outcome:</p> <ol style="list-style-type: none"> 1. To understand dynamic memory allocations techniques. 2. To understand how to write & use user defined functions. 3. Exercise concepts of file handling to manipulate file operations. 		

DSC-2B Theory-I Title: Web Programming – II		Hours 30
Unit 1	Interactive Web Pages using Form Form Object ,Text Element, Button Element, Submit Element, Reset element, Radio Element, Progress Bar, CheckBox, Working With Basics of XML - Introduction to XML ,Difference Between HTML and XML, Creating xml Document	8
Unit 2	Introduction to JavaScript : Introduction to JavaScript, JavaScript Variables, Data types, Operators, Built-in Functions in JavaScript, Control Structures in JavaScript, Built in Objects (Math, String, Date) and User defined objects, DOM.	7
Unit 3	JavaScript Validation and Event handling Array, History, Navigator, location, windows, Validation in JavaScript, Event and Event handling in JavaScript.	7
Unit 4	Bootstrap Introduction to Bootstrap, Advantages of Bootstrap, Downloading and installing of Bootstrap, Grid System, Text, images, buttons, list groups, Bootstrap Dropdowns, labels, Panels, Bootstrap Templates, Bootstrap Themes.	8
Course Outcome: 1) Students are able to develop a dynamic webpage by the use of javascript 2) Students will be able to write a well formed / valid XML document.		

DSC-2B Theory-II Title: Software Engineering- II		Hours 30
Unit 1	System Analysis and System Design Tools: Flow chart, Decision tables & Decision Trees, Structure charting Techniques (HIPO), Entity relation Analysis (ERD), Normalization, Input output design, Data flow Diagram (Physical, Logical), structured chart Data Dictionary: Features of Data Dictionary, Process specification Methods	8
Unit 2	Configuration and Construction of the System: Collection of system , statistics, Setting Sub-system Boundaries Construction of the system- Fractional Approach, Traditional and incremental approaches, conversion methods	7
Unit 3	Software Testing, Implementation and maintenance: Need of Testing, White Box, Black Box testing, Changeover, Pilot, Parallel, Software Implementation and maintenance	7
Unit 4	System Development Tools- Role, Benefits and weakness of case Tools, Taxonomy of case tools Case studies- PayRoll, Library System, Inventory Management System, College Admission System	8
<p>Course Outcome: After completion of the course students will understand the following</p> <ol style="list-style-type: none"> 1)They will be able to know the meaning of flowchart and all structural models 2)They can able to draw the ERD, DFT etc tools or diagrams of the real world applications 3)They will able to know the testing required in the software developments 		

DSC-3B Theory-I Title: Graph Theory		Hours 30
Unit 1	Graph Definition and elementary results, Types of graph: Simple graph, Multi-graph, pseudo graph, complete graph, Nullgraph, Regular graph, Bipartite graph, weighted graph, degree of a vertex, total degree of a graph, shaking hand lemma and elementary results, Adjacency and Incidence matrix.	8
Unit 2	Derived Graphs Sub graph, vertex deleted, and edge deleted subgraphs, vertex disjoint and edge disjoint subgraphs, complement of a graph, self complementary graphs. Operations on Graphs: Union, intersection and ring sum of two graphs, Product of two graphs.	7
Unit 3	Euler and Hamiltonian Graph. Walk, trail, path, Euler trail and circuit, Euler's graph, Fleury's algorithm, Chinese Postman problem. Hamiltonian Path and Circuit, Hamiltonian Graph, travelling salesman problem.	8
Unit 4	Trees: Basic Terminology and properties of Trees, Spanning Trees, Shortest spanning tree, Kruskal's algorithm for shortest spanning tree, branches & chords, fundamental cut sets & circuits	7
Course Outcome: <ol style="list-style-type: none"> 1. Demonstrate mathematical skills, analytical and critical thinking abilities. 2. Demonstrate comprehension of discrete structures and their relevance within the context of computer science, in the areas of data structures and algorithms. 3. Students completing this course will be able to use tree and graph algorithms to solve problems. 		

DSC-3B Theory-II Title: Statistical Methods-II		Hours 30
Unit-I	<p>Permutations & Combinations: Principles of counting, Permutations of n dissimilar objects taken r at a time (with without repetitions), Permutations of n objects not all of which r different, Combinations of n objects taken r at a time, Combinations with restriction on selection (excluding or including a particular object in the group), Numerical problems</p>	7
Unit-II	<p>Probability: Random expt. – Sample space (finite, infinite, countable), Events-Types of events, Probability – Classical def., axioms of probability, probability of an event, Theorems of probability (with proof) - i) $0 \leq P(A) \leq 1$, ii) $P(A) + P(A') = 1$, iii) $P(\Phi) = 0$ iv) $P(A) \leq P(B)$ when A is subset of B v) Addition law of probability (Statement only). Concept & def. of conditional probability, multiplication law of probability(Statement only), Concept & def. of conditional probability, multiplication theorem, Concept & def. of independence of two events, Numerical problems</p>	8
Unit-III	<p>Discrete random variable: Def. of r.v., discrete r.v., Def. of p.m.f., c.d.f. & properties of c.d.f., Def. of expectation & variance, theorems on expectation, Numerical problems. Standard Discrete Distribution: Binomial distribution- Def., mean, variance(only state), illustration of real life situations, additive property (statement only). Poisson distribution- Mean ,variance(only State), illustration of real life situation, additive property (Statement only), Numerical Problems. Geometric distribution –Def., mean, variance(only State), illustration of real life situation, Numerical problems.</p>	8
Unit-IV	<p>Continuous r. v.- Def.-continuous r.v., p.d.f., c.d.f., statement of properties of c.d.f. Def. of mean & variance, Numerical problems. Uniform distributions-Def., mean, variance(only State),Numerical Problems Normal Distribution- Definition, identification of parameters, nature of probability curve, s.n.v., properties of normal distribution, distribution of $aX+b$, $aX+bY+c$ when X & Y are independent, Numerical Problems</p>	7
<p>Course Outcome: Students will get Practical Knowledge of Statistics 1. Students will come to know application of statistical tools 2. Students will study Enhancement of computational ability & Enhancement of logical skills</p>		

DSC-4B Theory-I Title: Microprocessor		Hours 30
Unit 1	Fundamental of Microprocessor: Contents : Introduction to microprocessor ,Basic system bus architecture , Intel 8085 microprocessor features, Concept of T state , Machine cycle, Instruction cycle , Types of microprocessor(According to bus and application)	7
Unit 2	8 bit microprocessor Contents : Introduction, Types of 8 bit microprocessor ,Pin function of 8085 microprocessor, Internal architecture of 8085 microprocessor ,Applications	8
Unit 3	Instruction set Contents : Introduction ,Classification of instruction set ,Format of instructions , Addressing modes ,Assembly language programming of 8085(addition, subtraction, division, multiplication, orders)	7
Unit 4	Interfacing Contents : Concept of interfacing , Types of interfacing , Concept of I/O mapping & I/O memory mapping techniques, Study only Pin diagram ,Block diagram and Control word register of PPI[8255],Interfacing of 8255 to 8085,Block diagram and Control word register of Programmable timer[8253]	8
Course Outcome: 1. Access the basic knowledge of the microprocessor 8085 and explain its internal architecture and its operation within the area of manufacturing and performance. 2. Apply knowledge and demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor. 3. Study of interface IC's in order to interface the processor to external devices. 4. Evaluate assembly language programs to perform various basic operations		

DSC-4B Theory-II Title: Operating System-II		Hours 30
Unit 1	Deadlock Definition and concept of Deadlock, Handling Deadlocks Deadlock Prevention, Deadlock Avoidance Algorithm: Mutual exclusion, Resource allocation graph, (RAG), Bankers Algorithm ,Deadlock Detection and recovery	7
Unit 2	Memory Management Concept & Background of Memory Management , Swapping Continuous Memory Allocation, Fragmentation, Paging Segmentation, Virtual memory, Demand Paging	8
Unit 3	Process criteria Memory Allocation Methods, Page replacement, Page replacement algorithm: FIFO (First In First Out),LRU (Least Recently used),Optimal, LFU (Least frequently Used)	7
Unit 4	File System Concept of file, File Structure, File Naming (File attributes) File Types, File operations , File Protection ,Directory structure of file, Allocation of disk space for file, File Handling	8
<p>Course Outcome: After completing the above course students will be able to understand the following</p> <ol style="list-style-type: none"> 1. What is the deadlock in operating system and how it can be prevented, avoided 2. How the processes access the resources 3. How the memory management in operating system 4. Concept of file and different file allocation, access methods 		

DSC-1A & DSC-1B Practical-I

Experiment	Title
1	Introduction to Storage Devices(Input/Output)
2	Introduction to Different Parts of Mother Board
3	Assembly of Computer Peripherals
4	Installation of operating system.
5	Installation of application software's
6	Installation of Audio/Video Drivers, Graphics Drivers
7	Learning Network Settings and LAN Drivers.
8	Learning about all network devices basic settings
9	WAP to find out factorial of any number
10	WAP to print the sum and product of digits of an integer.
11	WAP to reverse a number
12	WAP to compute the factors of a given number
13	WAP to find out palindrome numbers between 1 to 100.
14	WAP to find out Armstrong numbers between 1 to 500.
15	WAP to check given number is perfect number or not.
16	WAP to generate Fibonacci series
17	WAP to check leap year
18	WAP to print following pattern A A B A B C A B C D A B C D E
19	WAP to print a triangle of stars as follows (take number of lines from user): * *** ***** ***** *****
20	WAP to generate following series:

	$1/2 - 2/2 + 3/2 - 4/2 + 5/2 \dots Nth$
21	WAP to perform following actions on an array entered by the user: Print the even-valued elements, odd-valued elements Calculate and print the sum and average of the elements of an array Print the maximum and minimum element of an array Remove the duplicates from the array Print the array in reverse order
22	Write a program to calculate multiplication of two matrices
23	Write a function to find whether a given number is prime or not.
24	Write a function that checks whether a given number is perfect or not.
25	WAP to print 1 to 10 numbers using recursion.
26	WAP to calculate factorial of given number using recursion
27	Write a program that swaps two numbers using pointers.
28	WAP to display array elements using pointer.
29	Write a program to allocate memory dynamically using malloc() / calloc().
30	WAP to pass array of structure to function
31	WAP to implement nesting of structure
32	WAP to implement self-referential structure
33	WAP to copy content of one file into another file
34	Write a program to accept integer numbers in file, find even and odd numbers between them store even number into even file and odd number into odd file and display the content of files.
35	WAP to draw three rectangles horizontally using graphics.
36	WAP to draw a circle and fill it with colour using graphics.
37	Starting Windows- Browsing Start Menu, Manipulating Windows- Moving, Resizing, Closing, Windows, Minimizing and Maximizing Windows, Working With Multiple Windows Using Windows Application. Using Word-

	Pad to create a document, entering text and saving the work. Using my computer- Changing the icon arrangement																																										
38	To Copy, move and delete files, using copy and paste, using drag and drop, creating a folder. Creating a file to a folder, copying and moving the files between drives, renaming files and folders, find Program- To search by file name, by name, by date, by type, by specific text.																																										
39	Changing date and time, changing display, choosing background, placing folder on desktop. Adding shortcuts to the folder and creating a shortcut.																																										
40	<p>i) write a leave letter to a Class teacher using MS-Word,</p> <p>ii) Write a Paragraph related to computer types (or any other topic) and set paragraph setting, line spacing and indentation (change default settings)</p> <p>iii) Create a Timetable using table in Ms-World</p>																																										
41	<p>i) Company A is looking into four potential projects and will accept them if the IRR is 10% or above, as shown in cell E2. What is the formula used in cell C2, which can be copied down to cell C3 through C5, to generate the results shown below?*</p> <table border="1" data-bbox="319 1093 1161 1393"> <thead> <tr> <th></th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> </tr> </thead> <tbody> <tr> <td>1</td> <td></td> <td>IRR</td> <td>Accept or Reject</td> <td></td> <td>Decision rule</td> </tr> <tr> <td>2</td> <td>Project 1</td> <td>12.5%</td> <td>Accept</td> <td></td> <td>10%</td> </tr> <tr> <td>3</td> <td>Project 2</td> <td>9.3%</td> <td>Reject</td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>Project 3</td> <td>8.2%</td> <td>Reject</td> <td></td> <td></td> </tr> <tr> <td>5</td> <td>Project 4</td> <td>11.1%</td> <td>Accept</td> <td></td> <td></td> </tr> <tr> <td>6</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>ii) create charts using Ms-Excel</p>		A	B	C	D	E	1		IRR	Accept or Reject		Decision rule	2	Project 1	12.5%	Accept		10%	3	Project 2	9.3%	Reject			4	Project 3	8.2%	Reject			5	Project 4	11.1%	Accept			6					
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42	Create a presentation on computer generations																																										
43	Create presentation using all timing settings, background, layout and Transitions																																										
44	Create a Database of Student using Ms-Access																																										
45	Create forms using Ms-Access																																										
46	Create reports using Ms-Access																																										

DSC-2A & DSC-2B Practical-I

Experiment	Title
1	Design a webpage that contain Text formatting tags(,<i>,<small> etc)
2	Design a web page that displays ordered and unordered list.
3	Design a webpage for image mapping.
4	Design a webpage that contains Hyperlinks.
5	Design a Login page.
6	Design a webpage that should contain given HTML5 attributes(Placeholder, autofocus, Required)
7	Design student registration form using CSS.
8	Design a homepage of college website using Frames and Frameset
9	Draw different shapes using SVG.
10	Design a web page that displays given contents in a table. Roll No, Name, Class, Marks (S1,S2,S3)
11	Design a web page that displays current Date and time.
12	Write the code to View simple xml file(Employee details).
13	Solve the following Program using Javascript to check if the given number is.. 1. Even or Odd 2. Perfect or Not 3. Prime or not 4. Leap year or not
14	Write javascript code working with functions : alert box, confirm box.
15	Design a webpage that shows use of in-built functions
16	Design a webpage that shows use of all math functions.
17	Design Employee registration form with validation.
18	Design the Login Page and apply bootstrap themes.
19	Create a Drop down menu with Bootstrap.
20	Design a web page of online mobile shopping using bootstrap.
21	Problem Statement- Process Model of a suitable System
22	Requirement Analysis-Creating Data Flow of a suitable System
23	Creating Data Dictionary of a suitable System
24	Draw ERD,DFD of criminal record management system for jailers, police officers and CBI officers
25	Draw ERD,DFD for Patient Appointment and Prescription Management System
26	Draw ERD,DFD for Whole Sale Management System.
27	Implement various fact finding techniques for Large Scale business organization
28	Draw Decision Tree from Large Scale Business Organization
29	Draw Flow chart of Calculating factorial, Sum of given numbers, All Arithmetic operations
30	Write Requirements Analysis, ERD, DFD, Data Dictionary, Flow Chart of case studies which are specified in syllabus

Note: Any open Source Software should be used to draw diagrams.
(for Program no.21-30)

DSC-3A & DSC-3B Practical-I

Experiment	Title
1	Algebra of matrices & Inverse of matrix by using adjoint method.
2	Matrix representation of relation, digraph of relation.
3	Transitive closure by using Warshall's algorithm.
4	Composition of function.
5	Inverse of function.
6	Adjacency & Incidence matrix.
7	Union, Intersection & ring sum of two graphs, Product of two graphs.
8	Fleury's algorithm.
9	Chinese postman problem.
10	Travelling salesman problem
11	Kruskal's algorithm for minimum weighted spanning tree
12	Construction of frequency dist. & graphical representation.
13	Measures of central tendency(ungrouped data).
14	Measures of central tendency(grouped data).
15	Measures of dispersion.
16	Computation of correlation coeff.
17	Fitting of lines of regression.
18	Fitting of Binomial distribution.
19	Fitting of Poission distribution.
20	Fitting of Geometric Distribution.
21	Fitting of Normal distribution.
22	Model sampling from uniform.
23	Model sampling from binomial distribution.

DSC-4A & DSC-4B Practical-I

Experiment	Title
1	Study of logic gates.
2	Study of Demorgan's Theorem.
3	Half adder using gates.
4	Full adder using gates.
5	.Half subtractor using basic gates
6	Interconversion of gates using NAND gate.
7	Interconversion of gates using NOR gate.
8	Study of multiplexer
9	Study of demultiplexer
10	RS flip flop
11	Study of Counters (divided by 2, 5 and 10) using IC-7490
12	Studying addressing modes of 8085 Microprocessor
13	Assembly language programming for arithmetic operations using 8085 microprocessor.
14	Assembly language programming for addition of two 8 bit BCD numbers
15	Assembly language programming for series addition of five 8 bit numbers
16	Assembly program for finding smallest among five number
17	Assembly program for finding largest among five number
18	Assembly program for ascending order of five 8bit using 8085 microprocessor.
19	Assembly program for descending order of five 8bitusing 8085 microprocessor.
20	Assembly program for block transfer of program.
21	Operating System Introduction –Showing Different Bars and Menus
22	Installation of Windows Operating System
23	Managing Space on a Disk
24	Printing and Scanning Document
25	Installation of Application Softwares -MS-Office, Antivirus
26	Management of User Account in Multiuser Operating System
27	Changing Control Panel Setting
28	Opening Paint ,Notepad etc using DOS Prompt
29	Virus Detection in Files, Device Drivers, System etc
30	CPU scheduling in OS-Showing Task Manager
31	Executing DOS Internal Commands
32	Executing DOS External Commands
33	Executing various internet Commands using DOS Prompt

List of Books:DSC-1A &1B			
	Title	Authors	Publisher
1	Programming in ANSI-C	E. Balgurusamy	Mc-Graw Hill
2	The C programming Language	Ritchie and Kernighan	Prentice Hall
3	Let Us C	Y.C. Kanetkar.	BPB
4	A structure Programming Approach using 'C'	Behrouz A. Forouzan, Richard F. Gilberg	
5	Computer Fundamentals	P.K. Sinha & Priti Sinha,3rd edition,	BPB
6	Computers Today	S. Basandra	Galgotia Pub.
7	Computer Fundamental	V. Rajaraman	PHI Learning View All
8	Computer Fundamental MS-Office	Anupama Jain,Avneet Mehra	Vitasta Publishing Pvt.Ltd
9	MS-OFFICE Training Guide	Satish Jain M. Geetha, Kratika	BPB pub.

List of Books: DSC -2A & 2B			
	Title	Authors	Publisher
1	HTML5 Black Book	Kogent Learning Solutions	Solutions IncDreamtech.
2	HTML,DHTML,Javascript,CGI	Ivan Bayross.	BPB publication
3	Beginning HTML and CSS	Rob Larsen.	John Wiley & sons
4	Analysis and Design of Information Systems	James Senn.	McGraw-Hill Education
5	System analysis and design	Elias Awad	Richard d Irwin
6	Software Engineering	Pressman	McGraw-Hill Education
7	System Analysis and Design and Introduction to Software Engineering	Parthasarathy / Khalkar	Everest Publishing House
8	Practical guide to structure System Design	Miller/Page/jones.	Prentice Hall

List of Books: DSC-3A &3B

	Title	Authors	Publisher
1	Introductory Methods of Numerical Analysis	S.S. Sastry	Prentice Hall
2	Discrete Mathematical structure for Computer Science	Alan Doerr and K Levassuer	Pearson Education
3	Elements of Discrete Mathematics	C.L.Liu	Tata McGraw-Hill Education Pvt. Ltd .
4	Computer Oriented Numerical Methods.	Rajaraman	PHI Learning
5	Elements of graph theory	Bhave&Raghunathan	Tata McGraw-Hill Education Pvt. Lt
6	Discrete mathematics & its applications	K. Rosen	Tata McGraw-Hill Education Pvt. Lt
7	Fundamentals of Mathematical Statistics	Gupta and Kapoor	Sultan Chand and Sons, New Delhi
8	Modern elementary Statistics	J.E.Freund	Prentice-Hall
9	Statistical Methods	J.Medhi	New Age International (P) Ltd
10	Programmed Statistics	B.L.Agarwal	New Age International (P) Ltd
11	Business Statistics	S. Shah	New Age International (P) Ltd

List of Books: DSC-4A & 4B			
	Title	Authors	Publisher
1	Modern Digital electronics	R.P.Jain	Mc Graw Hill, IV Edition
2	Digital principle & applications	Malvino Leech	New Age International Publication)
3	Microprocessor Architecture, Programming, and Applications with the 8085-	Ramesh S. Gaonkar	PENRAM International, 5th Edition)
4	Digital Fundamental	Floyd	Pearson Education
5	System programming and O.S.	D.M. Dhamdhare	Tata McGraw-Hill Education
6	Modern O.S.	Andrews Tanenbaum	Prentice Hall 1st-3rd Pearson PLC 4th
7	Operating System Concepts	Avi Silberschatz Peter Baer Galvin Greg Gagne	John Wiley & Sons, Inc.