

### BCA Programme (CBCS): 2018-19 onwards

Semester	Core DSC	Credits	Elective DSE	Credits	SEC	Credits
I	DSC-1	6				
	DSC-2	6				
	DSC-3	6				
II	DSC-4	6				
	DSC-5	6				
	DSC-6	6				
III	DSC-7	6				
	DSC-8	6				
	DSC-9	6				
IV	DSC-10	6				
	DSC-11	6				
	DSC-12	6				
V			DSE-1	6	SEC-1	2
			DSE-2	6	SEC-2	2
			DSE-3	6		
VI			DSE-4	6	SEC-3	2
			DSE-5	6	SEC-4	2
			DSE-6	6		

#### **Discipline Specific Courses:**

DSC-1: Computer Concepts and C Programming	4:0:2
DSC-2: Digital Electronics and Computer Organization	4:0:2
DSC-3: Discrete Transformations	4:2:0
DSC-4: Data structures and File Processing	4:0:2
DSC-5: System softwares and Operating Systems	4:0:2
DSC-6: Fundamentals of Information Technology	4:2:0
DSC-7: Object Oriented Programming with Java	4:0:2
DSC-8: Operation research	4:2:0
DSC-9: Accounting	4:0:2
DSC-10: Database Management Systems	4:0:2
DSC-11: Numerical and Statistical Analysis	4:0:2

DSC-12: Data Communication and Computer  
Networks

4:2:0

**List of Electives for both Vth and VIth semesters:**

(Select three of the following electives in Vth semester and two of the following electives in VIth semester, without repetition.)

Computer Graphics and animation	(L:T:P::4:0: 2)
Software Engineering	(L:T:P::4:2: 0)
.NET Programming	(L:T:P::4:2: 0)
Software Testing	(L:T:P::4:1: 1)
Web Technology	(L:T:P::4:0: 2)
Digital Image Processing	(L:T:P::4:0: 2)
Network Security	(L:T:P::4:2: 0)
Cloud Computing and Big Data Analytics	(L:T:P::4:1:1)

**Skill Oriented Course**

SEC- 1 :: DTP (Page Maker and CorelDraw)	(L;T:P::1:0: 1)
SEC- 2 ::Cyber Security	(L;T:P::1:0: 1)
SEC- 3 :: Introduction to Latex	(L;T:P::1:0: 1)
SEC- 4 ::Android Programming	(L;T:P::1:0: 1)

## BCA

### DSC-1: Computer Concepts and C Programming (LTP::4:0:2) 6 Credits

#### UNIT I: Programming Concepts and Introduction to C language:

System software, Application software. Program Translators – Assembler, Compiler, and Interpreter. Programming languages -Machine Level language, Assembly level language, High level language.

Program development life cycle: Problem definition, analysis, Design, Coding, Testing and debugging, Documentation and maintenance . Algorithm- Features, simple examples.

Flowchart –Symbols used in a flowchart, suitable examples,

**Overview of C:** Importance of C, basic structure of C program, executing a C program, sample C program,. Constants, variables and data types. C character set, C tokens, identifiers, constants, variables, declaration of variables, assigning values to variables. Data type conversion.

**Operators in C:** arithmetic operators, relational operators. Logical operators, assignment operators, increment and decrement operators, conditional operators, bitwise operators, special operators, precedence of arithmetical expression, relational expression, logical expressions.

#### UNIT II: Input and output operations:

Input and output statements, reading a character: getchar(), writing a character: putchar(), formatted and unformatted i/o statements.

**Control structures:**

**Branching:** if, if-else, nested if, else-if ladder, switch.

**Looping :** while, do-while and for loop. Jump statements, nested loops.

#### UNIT III: Arrays, Strings and Functions :

**Arrays:** Introduction, single dimensional array, two-dimensional arrays, initializing 2-d arrays, multidimensional arrays. Operations on arrays: traversal, insertion and deletion. Searching: linear search & binary search. Sorting: bubble sort, selection sort and insertion Sort.

**Strings :** Declaring and initializing string variables, reading string from terminal, writing string to screen, putting strings together. Comparison of two strings, length of a string, copying a string, string operations using library functions & User defined functions.

**Functions:** Introduction, types of functions, need for user-defined functions, function call, types of arguments, nesting of functions, a multi function program, recursion, storage classes.

#### UNIT IV: Structures ,Unions Pointers and Files

**Structures :** Definition and declaration of a structure, assigning and accessing the members of a structure, structure initialization, structure elements in memory, comparison of structure variables, structure with in the structure, array within structures.

**unions:** Definition and declaration, accessing the members of a union. comparison of structure and union.

**Pointers :** Advantages of pointers, declaration of pointer variable, pointer expressions, pointers and functions: call by value and call by reference, pointers and arrays, array of pointers, pointer to pointer.

**Files:** Definition, types of files. Creating text file. Modes of opening a file, formatted and unformatted i/o operations, random files.

### **Texts Books:**

1. E. Balaguruswamy : Programming in ANSI C” Tata Mc Graw-Hill
2. Problem Solving with C -PHI(EEE). By - M.T.Somashekara.
3. S. ByronGottfried. : “Programming with C”, Tata McGraw-Hill(2000)
4. Yashawant Kanetkar : “Let us C”
5. Brain Verminghan & Dennis M. Ritchie “ANSI C Programming” (PHI)

## **BCA**

### **DSC-2: Digital Electronics and Computer Organization (LTP::4:0:2) 6 Credits**

#### **Unit-I**

Number Systems – Introduction- Decimal, Binary, Octal and Hexadecimal. Inter- Conversions, Addition, Subtraction, Multiplication and Division in Binary Number System. 1’s and 2’s Complement method in Binary Number System. Subtraction using 1’s and 2’s Compliment, Weighted Number System, Binary Coded Decimal (BCD), Addition of BCD Numbers. Non-Weighted Number System, Applications, Excess-3, Gray code Conversions, Gray and Binary Codes. Fixed point and Floating point representation of numbers.

#### **Unit-II**

Boolean Algebra: Basic laws, DeMorgan’s theorem, Duality theorem, Sum Of Product method and Products Of Sum method. Karnaugh map (Upto 4 Variables, Don’t Care Condition). Fundamentals of Gates: Basic gates, Derived gates and Universal gates (Design).

#### **Unit-III**

Combinational and Sequential logic circuits - Half adder, Full adder, Half -subtractor and Fullsubtractor.

Flip-Flops - SR, D, JK, JK Master Slave, T Flip-flops, Decoders - 3 to 8 lines, Encoders-Octal to Binary. Multiplexer- 4 to 1 line, Counters-3 bits Binary Ripple counter, 3 bits synchronous binary counter. Shift registers- Serial-In-Parallel-Out, Parallel-In-Serial-Out, Serial-In-Serial-Out, Parallel-In-parallel-Out.

## **Unit-IV**

Basic Organization of Computers, Classification Micro, Mini, Mainframe and Super Computer, Von-Neumann M/c. CPU Organization: Fundamental Concepts: Fetching and storing a word in Memory, Register Transfer, Performing an Arithmetic & Logic Operation, Branching. Input / Output Organization: Peripheral Devices, Input – output Interface, I/O Bus, synchronous Data Transfer, Modes of Transfer: Programmed I/O, Interrupt Driven I/O, Direct Memory Access (DMA), DMA Controller, I/O Channel & Processor, Interrupts. Memory Organization: Computers Memory System Overview, Characteristics of Memory System, Semi-Conductor Main Memory types, Organization, Memory cell Operation.

### **Text Books:**

1. Digital fundamentals-Thomas.D.Floyd. Malvino Leach, digital principles and application (4th edition)
2. Computer System Architecture (3rd edition) Morris Mano PHI.
3. Computer Organization – by V.Carl Hamacher, Z.G.Vranesic, and S.G.Zaky, 3rd Edition. McGraw Hill,
4. Computer Organization & Design, (3rd Edition) by – D.A.Patterson & J.L.Hennessy – Morgan Kaufmann Publishers (Elseviers)

## **BCA**

### **DSC-3 Discrete Transformations (LTP:4:2:0) 6 Credits**

#### **UNIT –I**

Set Theory: Sets and Subsets, Set Operations and the Laws of Set Theory, Counting and Venn Diagrams, Cartesian Products and Relations, Functions–One-to-One, Onto Functions, Function Composition and Inverse Functions; Properties of Relations, Computer Recognition – Zero-One Matrices and Directed Graphs, Partial Orders – Hasse Diagrams, Equivalence Relations and Partitions.

#### **UNIT – II**

Fundamentals of Logic: Proposition, Logical Connectives and Truth Tables, Logic Equivalence – The Laws of Logic, Logical Implication – Rules of Inference; The Use of Quantifiers, Quantifiers, Definitions and the Proofs of Theorems

#### **UNIT –III**

Mathematical Induction and Recursion: Sequences and summations, Mathematical Induction, The Well Ordering Principle, Recursive Definitions, Structural Induction, Recursive algorithms. Counting: Basics of counting, Pigeonhole Principle, Permutation and Combinations, Binomial coefficients.

## UNIT – IV

Graphs: Introduction, Representing Graphs & Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest path problems, Planar Graphs, Graph colouring. Trees: Introduction, Applications of Trees, Tree Traversal, Spanning Trees, Minimum Spanning Trees.

### Text Books:

1. Ralph P. Grimaldi, “Discrete and Combinatorial Mathematics”, 5 th Edition, Pearson Education, 2004.
2. Kenneth H. Rosen, “Discrete Mathematics and its Applications”, 6 th Edition, McGraw Hill, 2007.
3. Jayant Ganguly, “A Treatise on Discrete Mathematical Structures”, SanguinePearson, 2010.
4. D.S. Malik and M.K. Sen, “Discrete Mathematical Structures: Theory and Applications”, Thomson, 2004.
5. Thomas Koshy, “Discrete Mathematics with Applications”, Elsevier, 2005, Reprint 2008.

## DSC-4 : Data Structures and Its Applications (LTP::4:0:2)

6 Credits

### Unit-1

Basic data structure : Primitive and non primitive, Abstract data structure, Operations, Data representation, Arrays - Memory representation of one and two dimensional arrays, Stack – Operations, Applications – Recursion, infix to postfix conversion, evaluation of postfix expression, Queues – Operations, Applications, circular queue-Operations, Dequeue, priority queue – uses of priority queues, Linked list - Dynamic memory allocation, Singly linked list – Operations, Circular linked list – Operations, Applications of linked list, doubly linked list – memory representation

### Unit-2

Tree – Terminologies, tree properties, binary tree-properties, memory representation – Array and Linked list representation, Binary search tree – Creation through insertion, searching, deletion algorithms, Tree traversal, balanced trees.

### Unit-3

Searching and sorting – sequential and binary search, internal and external sorting - bubble, selection, insertion, quick sort and merge sort, comparison of different sorting techniques, Memory management : Garbage collection algorithm for equal sized blocks, storage allocation of objects with mixed size, buddy system,

### Unit-4

Physical devices : Characteristics of storage devices such as disks, tapes, I/O buffering, basic file system operations – create, open, close, extend, delete, read block and write block, protection

mechanism, file organization : sequential, indexed, direct, directory structure: single level, two level, tree, acyclic directory structure.

### **Books Recommended**

1. M.T. Goodrich, R. Tamassia and D. Mount, *Data Structures and Algorithms in C++*, John Wiley and Sons, Inc., 2004.
2. T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, *Introduction to Algorithms*, 2nd Ed. Prentice-Hall of India, 2006.
1. 3. E.Horowitz and S.Sahani, *Fundamentals of Data structures*, Galgotia Book source Pvt. Ltd., 2003.



## **BCA**

### **DSC-5 SYSTEM SOFTWARES AND OPERATING SYSTEMS (L:T:P::4:0:2) 6 Credits**

#### **Unit 1: Machine Architecture, Assembler and Loaders**

Introduction, System software and machine architecture, Simplified Instructional Computers (SIC) and its architecture, Instruction Formats of IBM-360, Assembler ,Introduction, General design procedure, design of Assembler, statement of problem, data Structure, Format of Databases, Algorithm for pass 1 and pass 2.

Loader schemes-compile and go loader scheme, general loader, Absolute loader(Algorithm and Flow chart), Relocating loader, Direct linking loader, overlays, Dynamic loading.

#### **Unit 2: Introduction and process management**

Definition of Operating System, Need, Early systems, Simple monitors, Batch Systems, Multiprogramming, Time Sharing, Real time, Parallel and Distributed systems. Computing Environments – Traditional, Client Server, Peer-to-Peer and Web based. Process Management: Process concept – meaning of process, sequential and concurrent processes, process state, process control block, threads, Process scheduling – scheduling queues, schedulers, context switch.

#### **Unit 3: Scheduling and Deadlocks**

Processor -CPU I/O burst cycle, CPU Scheduler, Preemptive scheduling, dispatcher.

Scheduling criteria, Scheduling algorithms: First-Come-First-Served (FCFS), Shortest Job First (SJF), Priority Scheduling, Round Robin. Real time scheduling with pre-emption and Non-preemption. Deadlocks: Definition with example, System model, Dead lock characterization – Necessary Conditions Resource Allocation Graph, Dead lock prevention, Avoidance and detection, Recovery from dead lock.

#### **Unit 4: Memory Management**

Introduction to memory management, functions of memory management, partitioned memory- single partition, multiple partition (MFT & MVT), fragmentation, memory management technique- paging, segmentation, Demand paging, page replacement, page replacement algorithms- FIFO, LRU, Optional page replacement.

#### **Text Books:**

1. System programming – John. J. Donovan.
2. System Software – Leland L. Beck, Third edition, Addison Wesley 1997.
3. Operating System Concepts, Abraham Silberschatz and Peter Baer Galvin, Fifth edition, Addison - wesley 1989.
4. Operating System Concepts & Design, Milan Milonkovic, II Edition, McGRaw Hill 1992.
5. Operating Systems, Stallings, Pearson Edition.
6. Operating System Concepts, Tanenbaum, Pearson Education.

## BCA

### DSC-6 : Fundamentals of Information Technology

(LTP::4:2:0) 6 Credits

#### Unit - I

Introduction- Characteristics of Computers, Evolution of computers, Capabilities and limitations of computers, Generations of computers, Types of computers (micro, mini, main frame, super computers, Laptop, Tablets), Analog, Digital and hybrid computers, Block diagram of computer, computer applications business and scientific. Data organization: Drives, Files, Directories. Basic components of computers: Input devices- Keyboard, mouse, Touch Screens, Joystick, Electronic pen, Trackball, Scanning Devices-Optical Scanners, OCR, OMR, Bar Code Readers, MICR, Digitizer, Electronic card reader, Image Capturing Devices-Digital Cameras.

#### Unit - II

Output devices- Monitors- CRT, LCD/TFT, Printers- Dot matrix, Inkjet, Laser, Plotters- Drum, Flatbed, Screen image projector. Types of Memory (Primary And Secondary) RAM, ROM, PROM, EPROM, EEPROM Secondary Storage Devices- Magnetic Tape, Magnetic Disks-Internal Hard Disk, External Hard Drives, Floppy Disks, Optical Disks-CD, CD-R, CD-RW, DVD, Solid State Storage-Flash Memory, USB Drives.

#### Unit- III

Computer Software- Software and its Need, Types of software-System software, Application software, System software-operating system, utility program, programming languages, assemblers, compilers and interpreter, introduction to operation system for PCs-DOS, windows, Linux, Types of Programming Languages: Machine Languages, Assembly Languages, High Level Languages, Virus working, feature, types of viruses, virus detection prevention and cure.

#### Unit - IV

Introduction to computer network, types of computer network: LAN, WAN, MAN, Topologies Computer Security :The Need for Computer Security, Basic Security Concepts, Threats to Users, Threats to Hardware, Threats to Data, Taking protective measures– Protecting Yourself, Protecting your privacy, Keeping your Data Secure. Introduction to GUI, Internet & www, email, browsers, search engines, internet chat, creating static web pages, E commerce basics, EDI, types of Ecommerce, Benefits and limitations of ecommerce, Cyber law ,Cyber banking, E-payment, Security, Cyber act, Legal and ethical issues in ecommerce, Cybercrime.

#### Text Books:

1. Computer Fundamentals, V Rajaraman.
2. Computer Fundamentals, P.K Sinha
1. 3. Computers Today, Mc Grow Hill publication

