

**Himachal Pradesh Technical University,  
Hamirpur (H.P.)**



**CURRICULUM (CBCS)**

**Bachelor of Computer Applications (BCA)**

**(1<sup>st</sup> to 2<sup>nd</sup> Semester)**

**Teaching and Examination Scheme**

**SCHEME OF TEACHING AND EXAMINATION**  
**Bachelor of Computer Applications**

**SEMESTER –I**

S. N.	Cat.	Subject Code	Title	Teaching Hours Per Week			Credits	Examination		
				L	T	P		C	IA	ESE
1	MC	BCA-101	Communication English	3	0	0	3	40	60	100
2	PC	BCA-102	Programming in C	4	1	0	4	40	60	100
3	PC	BCA-103	Mathematics	3	1	0	3	40	60	100
4	PC	BCA-104	Computer Fundamentals & Information Technology	4	1	0	4	40	60	100
5	PC	BCA-105	PC Packages (Word, Excel & Power Point)	4	1	0	4	40	60	100
<b>Labs:</b>										
1	PC	BCA-106	Lab-I: Programming in C	0	0	3	1	50	50	100
2	PC	BCA-107	Lab-II: Communication Lab, PC Packages (Word, Excel & Power Point)	0	0	3	1	50	50	100
<b>Total:</b>				<b>18</b>	<b>4</b>	<b>6</b>	<b>20</b>	<b>300</b>	<b>400</b>	<b>700</b>

<b>Legend:</b>	<b>L</b> -Lecture	<b>T</b> -Tutorial
	<b>P</b> -Practical	<b>C</b> - Credits
	<b>IA</b> - Internal Assessment	<b>ESE</b> -End Semester Examination

**SCHEME OF TEACHING AND EXAMINATION**  
**Bachelor of Computer Applications**

**SEMESTER –II**

S. N.	Cat.	Subject Code	Title	Teaching Hours Per Week			Credits	Examination		
				L	T	P		C	IA	ESE
1	MC	BCA-201	Business Communication	3	0	0	3	40	60	100
2	PC	BCA-202	Numerical Methods	3	1	0	3	40	60	100
3	PC	BCA-203	OOP's Using C++	4	1	0	4	40	60	100
4	PC	BCA-204	Digital Electronics	4	1	0	4	40	60	100
5	PC	BCA-205	Data Structures	4	1	0	4	40	60	100
<b>Labs:</b>										
1	PC	BCA-206	Lab-III: OOP's Using C++	0	0	3	1	50	50	100
2	PC	BCA-207	Lab-IV: Data Structures	0	0	3	1	50	50	100
<b>Total</b>				<b>18</b>	<b>4</b>	<b>6</b>	<b>20</b>	<b>300</b>	<b>400</b>	<b>700</b>

<b>Legend:</b>	<b>L</b> -Lecture	<b>T</b> -Tutorial
	<b>P</b> -Practical	<b>C</b> - Credits
	<b>IA</b> - Internal Assessment	<b>ESE</b> -End Semester Examination

## SEMESTER-I

### BCA-101: COMMUNICATIVE ENGLISH

#### TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hrs

#### COURSE CONTENTS:

Unit	Contents	No. of hours
<b>I</b>	<b>English Language:</b> Sentence, Parts of Speech, Tenses, Active Passive Voice, Direct Indirect speech, Creative Writing & Vocabulary, Comprehension Passage, Reading of Biographies of at least 10 IT Business Personalities (can be a home assignment or classroom reading).	<b>10</b>
<b>II</b>	<b>Writing Skills:</b> Inter- Office Memorandums, Faxes, E-Mails, Writing Effective Sales Letters to Agents, Suppliers, Customers, Report Writing, Project Writing.	<b>10</b>
<b>III</b>	<b>Curriculum Vitae (CV):</b> Drafting a CV; writing job application and other applications; do's and don'ts while appearing for an Interview; types of interview.	<b>10</b>
<b>IV</b>	<b>Listening Skills:</b> It's Importance as Individual and as a Leader or as a Worker, Its Types, and Barriers to Listening & Remedies to Improve Listening barriers. Non-Verbal Communication - Understanding What is Called Non-Verbal Communication, its Importance as an Individual, as a Student, as a Worker and as a Leader, its Types.	<b>12</b>

#### TEXT BOOKS:

1. Effective Business Communication-M.V.Rodriguez.
2. Business Communication- Paperback Edition, Oxford University Press.

#### REFERENCE BOOKS:

1. Advanced Communication Skills- V. Prasad, Atma Ram Publications, and New Delhi.
2. Business Communication by Meenakshi Raman and Prakash Singh (Oxford).

## BCA-102: PROGRAMMING IN C

### TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
4	1	0	4	40	60	100	3 hrs

### COURSE CONTENTS:

Unit	Contents	No. of hours
<b>I</b>	<b>Algorithm and Programming Development:</b> Steps in development of a Program, Flow Charts, Algorithm Development, Program Debugging, Compilation and Execution. <b>Fundamentals of C:</b> I/O Statements, Assignment Statements, Constants, Variables, Operators and Expressions, Standards and Formatted Statements, Data Types and Identifiers.	<b>10</b>
<b>II</b>	<b>Control Structures:</b> Decision Making with If Statement, If-Else and Nested-If, While and Do-while, for Loop. <b>Jump statements:</b> Break, Continue, go to and Switch Statement. <b>Arrays:</b> Introduction to Arrays, Array Declaration, Single and Multidimensional Array, Memory Representation, Matrices. <b>Strings:</b> Introduction, String Handling Functions.	<b>12</b>
<b>III</b>	<b>Functions:</b> Introduction to Functions, Function Declaration, Function Categories, Standard Functions, Parameters and Parameter Passing, Call-by Value, Call By Reference, Recursion. <b>Structure and Union:</b> Declaration of Structure, Accessing Structure Members, Structure Initialization, Arrays of Structure, nested Structures, Unions	<b>10</b>
<b>IV</b>	<b>Pointers:</b> Introduction to Pointers, Address operator and pointers, Declaring and Initializing pointers, Assignment through pointers, Pointers and <b>Files Handling:</b> Introduction, Creating a Data File, Opening and Closing a Data File, Processing a DataFile.	<b>10</b>

### TEXT BOOKS:

1. Let us C-Yashvant P Kanetkar, Seventh Edition, BPB Publications, NewDelhi.
2. Programming in ANSIC- E. Balagurusami, Fourth Edition, Tata McGraw Hill
3. Programming in C, Byron S. Gottfried, Second Edition, McGraw Hills.

**REFERENCE BOOKS:**

1. The C Programming Language-Brian W. Kernighan & Dennis M. Ritchie, Prentice Hall of India.
2. Complete reference to C- Tata Mcgraw Hill.

## BCA- 103: MATHEMATICS

### TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	3	40	60	100	3 hrs

### COURSE CONTENTS:

Unit	Contents	No. of Hours
I	<b>Set Theory:</b> Relations, Quadratic Equations, Sequence & Series, Binomial Theorems, Determinants, Matrices.	8
II	<b>Rectangular Co-ordinates:</b> Length of a Line Segment, Section Ratio, Area of a Triangle, Equations of a Straight Line Circles.	10
III	<b>Trigonometric Functions:</b> Trigonometrical Ratios of Negative and Associated Angles, Trigonometrical Ratios of Compound Angles, Multiple and Sub Multiple Angles, Heights and Distances.	12
IV	<b>Functions:</b> Limits and Continuity, Derivative of Functions, Maxima & Minima, Indefinite Integrals and Definite Integrals.	12

### TEXT BOOKS:

1. Systematic Modern Mathematics- L.R. Dhanda, G.K. Saini and Suranjan Saha, Kalyani Publishers.
2. Introduction to Analytic Number Theory-Tom M. Apostol, Narosa Publishing House, New Delhi
3. Elements of Number Theory-John Stillwell, Springer Publisher.

### REFERENCES BOOKS:

1. Number Theory -Shailesh A. Shirali and C.S. Yogananda, Universities Press
2. Elementary Number Theory: A Collection of problems with solutions-V.K. Krishnan, University Press.

**BCA- 104: COMPUTER FUNDAMENTALS & INFORMATION TECHNOLOGY****TEACHING AND EXAMINATION SCHEME:**

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
4	1	0	4	40	60	100	3 hrs

**COURSE CONTENTS:**

Unit	Contents	No. of Hours
<b>I</b>	<b>Introduction:</b> Characteristics, Evolution, Capabilities and Limitations Generations of Computers. <b>Types of Computers:</b> Micro, Mini, Main Frame, Supercomputers, Block Diagram of Computer, Instruction Set, Registers, Processor Speed, Type of Processors.	<b>10</b>
<b>II</b>	<b>Memory:</b> Main Memory, RAMS, ROM, EPROM, PROM, Cache Memory. <b>Secondary Storage Devices:</b> Magnetic Tape, Magnetic Disks Internal & External Hard Drives, Floppy Disks, Optical Disks-CD, VCD, CD-R, CD-RW, DVD, Flash Memory, USB Drives.	<b>10</b>
<b>III</b>	<b>I/O Devices:</b> Introduction & Types of I/O devices, <b>Input Devices:</b> Keyboard, Mouse, Touch Screens, Joystick, Electronic Pen, and Trackball, <b>Scanning Devices:</b> Optical Scanners, OCR, OMR, Bar Code Readers, MICR, Digitizer, Electronic card reader, Image Capturing Devices-Digital Cameras. <b>Output Devices:</b> Monitors CRT, LCD/TFT, Printers- Dot matrix, Inkjet, Laser, Plotters- Drum, Flatbed, Screen image projector.	<b>12</b>
<b>IV</b>	<b>Computer Software:</b> Software and its Need, Types of software System Software, Application Software, System software, Utility Program. <b>Programming Languages:</b> Types of Computer Languages, their Merits and Demerits Assemblers, Compilers and Interpreter, computer virus and its types, antivirus.	<b>10</b>

**TEXT BOOKS:**

1. Basic Computer Engineering- Pawan Thakur, S.K. Gandhi SatyaPrakashan, New Dehli.
2. Computer Fundamentals-Pradeep K. Sinha, Priti Sinha, BPB Publications.

**REFERENCES BOOKS:**

1. Fundamental of Computers-Larry long & Nancy long, Twelfth edition, Prentice Hall
2. Computers Today- D. H. Sanders, Fourth Edition, McGraw Hill,

**BCA- 105: PC PACKAGES (WORD, EXCEL & POWER POINT)****TEACHING AND EXAMINATION SCHEME:**

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
4	1	0	4	40	60	100	3 hrs

**COURSE CONTENTS:**

Unit	Contents	No. of hours
<b>I</b>	<b>DOS &amp; Windows:</b> History and Version of DOS, <b>Internal Command:</b> DIR, DATE, TIME, CLS, CD, RD, MD, PATH, TYPE, DEL, ECHO, COPY, REN, PROMPT, VOL, VER etc. <b>External Command:</b> ATTRIB, CHKDSK, DISKCOPY, DISKCOMP, XCOPY, TREE, DELTREE, DOSKEY, FORMAT, FIND, SORT, FDISK, MORE, SYS etc. Concept of Files & Directories, Wild card characters. <b>Windows:</b> Definition, Benefits, Features & Uses of Windows, Control Panel, Accessories, Task Bar, My Computer, Recycle bin.	<b>10</b>
<b>II</b>	<b>MS Office:</b> Elements, Introduction to Office & Features, <b>MS-Word:</b> Definition, Benefits, Features & uses of Word, Menus, Toolbars, Cursor, Short Cut & Hot keys, Editing Text, Opening, Creating, saving, Printing, Editing Files, Formatting text, Find and replace, Tables and Columns, Spell check, Thesaurus, File protection, Mail Merge, Macros.	<b>12</b>
<b>III</b>	<b>MS Excel :</b> Definition, Benefits, Features & Uses of MS Excel, Menus, Toolbars, Worksheets, Formatting Worksheets and Restricting Data, Calculating with Formulas and Functions, Ranges, Auto fill, Data (Sort, Filter, Validation, Subtotal), Viewing and Manipulating Data with Charts and PivotTables, Print, Goal seek, Scenario, Macros, Creating Excel Databases.	<b>10</b>
<b>IV</b>	<b>MS – Power Point:</b> Definition, Benefits, Features & Uses of Power Point, Menus, Toolbars, Creating and Editing Slides, Adding graphics, Multimedia, and Special Effects to Slides, Insert (Picture, Slide & Text), Master Slide, Views, Animation, Action Buttons.	<b>10</b>

**TEXT BOOKS:**

1. PC Software – R.K Taxali.
2. Computer course-Biswaroop Roy Choudhary, ‘’, Fusion Books.
3. MS-Office -Ron Masfield , Tech publication.

**REFERENCES BOOKS:**

1. Microsoft Office - The Complete Reference,
2. Microsoft Office - Fundamentals By Laura Story, Dawna Walls



## BCA- 106: PROGRAMMING IN C LAB-I

### TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 Hrs

### Suggested Practical List:

1. WAP to calculate simple interest.
2. WAP to implement whether entered number is prime or not.
3. WAP to print all no. range from 1-500.
4. WAP to HCF of two numbers.
5. WAP to reverse a number or find whether it is a palindrome or not.
6. WAP to find sum of digit of five digit number.
7. WAP to print all Armstrong number between 1 to 1000.
8. WAP to implement the concept of call by value and call by reference.
9. WAP to implement the concept of static and extern storage class.
10. WAP to implement the concept of linear search and binary search.
11. WAP to implement the concept of bubble sort by using array.
12. WAP to multiply two matrixes.
13. WAP to implement the concept of transpose of matrix.
14. WAP to implement the concept of parallel array.
15. WAP to show how one and two dimensional array passed to function.
16. WAP to show the use of pointer to pointer operator.
17. WAP to demonstrate the use of array of pointer and pointer to array.
18. WAP to show the use of string of pointer.
19. WAP to demonstrate various operations performed on pointers.
20. Declaration initialization and accessing of structure element.
21. WAP to demonstrate Nested structure.
22. WAP to passing of a structure to the function.
23. WAP to reverse a given string without using library function.
24. WAP to delete a file.
25. WAP to read, write the content of file.
26. WAP to copy the content of one file to another.

**BCA- 107: COMMUNICATION LAB, PC PACKAGES (WORD, EXCEL & POWER POINT) LAB-II**

**TEACHING AND EXAMINATION SCHEME:**

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 Hrs

**Suggested Practical List:**

1. Create, save and print a document file in MS-Word.
2. Create header and footer in MS- Word.
3. Create the Time table of BCA department.
4. Create and remove a Macro in MS-Word.
5. Design a birthday invitation to your friends using mail merge in MS- Word.
6. Create a Table in MS- Word and write the steps to put 20 Records in the Table.
7. Create an Advertisement in MS-word.
8. Prepare a Mark Sheet of your class subjects.
9. Prepare a Salary Slip of an employee.
10. Prepare a bar chart & pie chart for analysis of Election Results.
11. Prepare a generic Bill of a Super Market.
12. Prepare an Attendance sheet of 10 students for any 6 subjects of your syllabus. Calculate their total attendance, total percentage of attendance of each student & average of attendance.
13. Create a worksheet on Students list of any 4 faculties and perform following database functions on it.  
(i). Sort data by Name (ii). Filter data by Class (iii). Subtotal of no. of students by Class.
14. Design a presentation of your institute using auto content wizard, design template and blank presentation.
15. Prepare a bar chart & pie chart for analysis of Election Results.
16. Design a presentation illustrating insertion of pictures, word-art and clipart.
17. Design a presentation learns how to save it in different format, copying and opening an existing presentation.
18. Design a presentation learns insertion of movie, animation and sound.
19. Illustrate use of custom animation and slide transition (using different effects).
20. Design a presentation using charts and tables of the marks obtained in class.
21. Illustrate use of macro in text formatting in your presentation.
22. Design a presentation to demonstrate verbal (sounds, language, and tone of voice).
23. Design a presentation illustrating aural (listening and hearing).
24. Design a presentation learns non-verbal (facial expressions, body language, and posture) .
25. Design a presentation to demonstrate written (journals, emails, blogs, and text messages) .
26. Design a presentation illustrating aural visual (signs, symbols, and pictures).

## SEMESTER-II

### BCA-201: BUSINESS COMMUNICATION

#### TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hrs

#### COURSE CONTENTS:

Unit	Contents	No. of hours
<b>I</b>	<b>Introduction to Business Communication:</b> Meaning and Definition, Process and Classification of communication, Elements & Characteristics of Communication, Barriers to Effective Communication in Business Organization; Formal and Informal Communication, Grapevine, Importance of Effective Communication in Business House, Principles of Effective Communication.	<b>12</b>
<b>II</b>	<b>Writing Skills:</b> Inter-office memorandums, faxes, E-Mails, Writing Effective Sales Letters – To agents, Suppliers, Customers, Report Writing, Project Writing.	<b>10</b>
<b>III</b>	<b>Business Letters:</b> Business Letters Need and Functions of Business Letters, Planning & Layout of Business Letter - Kinds of Business Letters - Essentials of Effective Correspondence.	<b>10</b>
<b>IV</b>	<b>Drafting of business letters:</b> Drafting of Business Letters Enquiries and Replies, Placing and Fulfilling Orders, Complaints and Follow-Up, Sales letters, Circular Letters - Application for employment and resume.	<b>10</b>

#### TEXT BOOKS:

1. Effective Business Communication-M.V. Rodriguez
2. Business Communication - Meenakshi Raman, Parkash Singh, Paperback Edition, Oxford University Press.

#### REFERENCE BOOKS:

1. Advanced Communication Skills- V. Prasad, Atma Ram Publications, and New Delhi.
2. Business Communication by Meenakshi Raman and Prakash Singh (Oxford).

**BCA-202: NUMERICAL METHODS****TEACHING AND EXAMINATION SCHEME:**

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	3	40	60	100	3 hrs

**COURSE CONTENTS:**

Unit	Contents	No. of hours
<b>I</b>	<b>Representation of Numbers:</b> Decimal to Binary Conversion, Floating Point Representation of Numbers, Integer and Real/Floating Point Arithmetic, Different Types of Errors, Error in the Approximation of a Function, Error in Series Approximation.	<b>10</b>
<b>II</b>	<b>Algebraic and Transcendental:</b> Solution of Algebraic and Transcendental Equation using Bisection Method, Regula-Falsi Method, Newton-Raphson method. Solution of Simultaneous Linear Equations using Gauss Elimination Method, Gauss-Jordon Method, Jacobi's iterative method, Gauss-Seidel iterative Method.	<b>11</b>
<b>III</b>	<b>Interpolation:</b> Finite Difference and Operators, Newton Forward, Newton Backward, Gauss Forward, Gauss Backward.	<b>10</b>
<b>IV</b>	<b>Numerical differentiation:</b> Differentiating a Graphical Function, Differentiating a Tabulated Function- Equal and Un-equal Intervals, Numerical Integration, Newton -Cotes Formula, Trapezoidal Rule, Simpson's $1/3^{\text{rd}}$ and $3/8^{\text{th}}$ Rule, Weddle's rule.	<b>11</b>

**TEXT BOOKS:**

1. Numerical Methods in Engg. & Science-B.S. Grewal, Khanna Book Publishing Co., New Delhi.
2. Computer Oriented Numerical Methods-R.S. Salaria, Khanna Book Publishing Co., New Delhi.

**REFERENCE BOOKS:**

1. Numerical Method-S.S. Sastry, PHI.
2. Elements of Discrete Mathematics-Liu C.L.

**TEACHING AND EXAMINATION SCHEME:**

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
4	1	0	4	40	60	100	3 hrs

**COURSE CONTENTS:**

Unit	Contents	No. of hours
<b>I</b>	<b>Object Oriented Programming:</b> Need for OOP, Object Oriented Approach, Characteristics of OOP language, Relationship Between C and C++. <b>Programming Basic:</b> Basic Program Construction, Basic Concepts of C++, Token, Keyword, Output using cout, input with cin, Data Type, Manipulator& Operator, Scope Resolution Operator.	<b>8</b>
<b>II</b>	<b>Decision Control and Loops Statements:</b> If, If- Else, Nested If, Switch, break, continue, go to Statement. <b>Looping:</b> For Loop, While, Do While. <b>Arrays:</b> Array fundamental, defining array, array elements, Accessing array elements, Initializing arrays, Single & Multidimensional Arrays. <b>Functions:</b> Creating Functions, Passing arguments to functions, Returning Values from Functions, Reference arguments.	<b>12</b>
<b>III</b>	<b>Objects and Classes:</b> Definition, A Simple Class, Specifying a Class, Class Members, C++ objects as physical objects, C++ objects as data types, objects as function arguments, Constructors and Destructors, Function Overloading <b>Operator overloading:</b> Rules of Overloading, Overloading Unary & Binary Operators, Data Conversion.	<b>12</b>
<b>IV</b>	<b>Inheritance:</b> Derived class and base class, specifying the derived class, accessing base class members, derived class constructors, class hierarchies, public and private Inheritance, levels of inheritance. <b>Polymorphism:</b> Meaning & Types, Virtual Function.	<b>10</b>

**TEXT BOOKS:**

1. Object Oriented Programming in C++-E. Balagurusamy, McGraw Hill Education (India).
2. Object-Oriented Programming in C++ -Robert Lafore, Galgotia Publications.
3. Object-Oriented Programming using C++ - B. Chandra, Narosa Publications.

**REFERENCE BOOKS:**

1. The C++ Programming Language-Kerninghan B.W. & Ritchie D. M., PHIPublications.
2. The Complete Reference to C++- Tata McGraw Hill.
3. C++ Primer -S. B. Lippman& J. Lajoie, 3rd Edition, Addison Wesley, 2000.

## BCA-204: DIGITAL ELECTRONICS

### TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
4	1	0	4	40	60	100	3 hrs

### COURSE CONTENTS:

Unit	Contents	No. of hours
<b>I</b>	<b>Number Systems:</b> Decimal, Binary, Octal and Hexadecimal Number systems, <b>Codes:</b> BCD, Gray Code, Excess-3 Code, ASCII, EBCDIC, and Conversion between various Codes.	<b>10</b>
<b>II</b>	<b>Logic gates:</b> AND, OR, NOT Gates and their Truth Tables, NOR, NAND & XOR gates, Boolean algebra, Basic Boolean Law's, De-Morgan's theorem, Boolean function and their truth tables.	<b>10</b>
<b>III</b>	<b>MAP Simplification:</b> Minimization techniques, K-Map, Sum of Product & Product of Sum, Venn diagram. Combinational circuit.	<b>12</b>
<b>IV</b>	<b>Sequential Circuits:</b> Half adder & Full adder, BCD adder, Full Subtractor, Flip-flops- RS, D, JK, T & Master-Slave flip-flops, Shift registers, Multiplexer, Encoder, Decoder.	<b>10</b>

### TEXT BOOKS:

1. Digital Logic and Computer Design - Morris Mano, Pearson
2. An Introduction To Digital Computer Design- Rajaraman V. & Radhakrishnan, PHI.
3. Digital Computer Electronics-Malvino, TMH Publications.

### REFERENCE BOOKS:

1. Digital Integrated Electronics-Taub, Helbert and Schilling, TMH
2. Digital Principles & Applications- Malvino & Leach, TMH Publications.
3. Modern Digital Electronics -Jain R.P., TMH Publications.

## BCA-205: DATA STRUCTURE

### TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
4	1	0	4	40	60	100	3 hrs

### COURSE CONTENTS:

Unit	Contents	No. of hours
<b>I</b>	<b>Introduction to Data Structures:</b> Basic Concept of Data, Problem Analysis, Algorithm Complexity, Big O notation and time space tradeoff, <b>Arrays:</b> Memory representation and various operations. Address calculation,	<b>8</b>
<b>II</b>	<b>Stacks:</b> Definition & concepts of stack structure, Implementation of stacks, Operation on stacks (push & pop), Application of stacks <b>Queue:</b> Definition & concept of queues, implementation of queue, operation on queues (insert & delete), Type of queues (circular queue, priority queue).	<b>10</b>
<b>III</b>	<b>Linked List:</b> Definition, Type (Linear, Circular, Doubly Linked, and Inverted), Representing linked lists in memory; Advantages of using linked list over arrays, Various operations on Linked list. <b>Trees:</b> Definition & Concepts, Basic trees, Binary tree representations, Binary tree traversals and application of trees.	<b>12</b>
<b>IV</b>	<b>Graphs:</b> Description of graph structure, Implementing graphs in memory, Graph traversals. <b>Sorting &amp; Searching:</b> Selection sort, Bubble sort, Merge sort, Radix sort, Quick sort, Sequential search, Linear search and their complexity.	<b>12</b>

### TEXT BOOKS:

1. Data Structures-Lipschutz Seymour, Second Edition, TMH.
2. Algorithm + Data Structures Programs-Niclaus Wirth, Prentice Hall.
3. Data Structures-Tanenbaum, Paperback Edition.

### REFERENCE BOOKS:

1. An Introduction to Data Structures Applications-Trembley&Soreson, Second Edition.
2. Data Structures using C –Tanenbaum, Pearson/PHI.
3. Introduction to Algorithms-T .H .Cormen, C .E .Leiserson, R .L .Rivest, PHI/Pearson.

## BCA-206: OOP's USING C++ LAB-III

### TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hrs

#### Suggested Practical List:

1. Write a C++ program to find the sum of individual digits of a positive integer.
2. Write a C++ program to generate the first n terms of the Fibonacci sequence.
3. Write a C++ program to generate all the prime numbers between 1 and n , where n is a value supplied by the user.
4. Write a C++ program that uses functions a) To swap two integers. b) To swap two characters.
5. Write a C++ program to find both the largest and smallest number in a list of integers.
6. Write a C++ program to sort a list of numbers in ascending order.
7. Write a C++ program to sort a list of names in ascending order.
8. Write a C++ program to implement the matrix using a class. The operations supported by are:
  - a) Reading a matrix.
  - b) Addition of matrices.
  - c) Printing a matrix.
  - d) Subtraction of matrices.
  - e) Multiplication of matrices.
9. Write a C++ program that overloads the + operator and relational operators (suitable) to perform the following operations:
  - a) Concatenation of two strings.
  - b) Comparison of two strings.
10. Write a template based C++ program that determines if a particular value occurs in an array.
11. Write a C++ program that uses functions to perform the following operations to:
  - a) Insert a sub-string in to the given main string from a given position.
  - b) Delete n characters from a given position in a given string.
12. Write a C++ program that uses a function to reverse the given character string in place, without any duplication of characters.
13. Write a C++ program to make the frequency count of letters in a given text.
14. Write a C++ program to count the lines, words and characters in a given text.



15. Write a C++ program to determine if the given string is a palindrome or not.
16. Write a C++ program to construct of pyramid of numbers.
17. Write C++ programs that illustrate how the following forms of inheritance are supported: a) Single inheritance b) Multiple inheritance c) Multi level inheritance d) Hierarchical inheritance.
18. Write a C++ program that illustrates the order of execution of constructors and destructors when new class is derived from more than one base class.
19. Write a C++ program that illustrates how run time polymorphism is achieved using virtual functions.
20. Write a C++ program that illustrates the role of virtual base class in building class hierarchy.

## BCA- 207: DATA STRUCTURES LAB-IV

### TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hrs

### Suggested Practical List:

1. Write a program to static implementation on one dimensional array.
2. Write a program to calculate matrix multiplication.
3. Write a program to static implementation to stack operation.
4. Write a program to static implementation to queue.
5. Write a program to stack implementation using linked list.
6. Write a program to queue implementation using linked list.
7. Write a program to circular queue implement using array.
8. Write a program to insert an element in linked list. a) At the beginning b) At the end
9. Write a program to delete an element at specific position in linked list.
10. Write a program to delete an element to end of the list.
11. Write a program to circular queue implement using linked list.
12. Write a program for display, insertion and deletion into a doubly linked list.
13. Write a program for creation of binary tree.
14. Write a program to insert and delete on a binary search tree.
15. Write a program for insertion sort.
16. Write a program for Bubble sort.
17. Write a program for Selection sort.
18. Write a program for Quick sort.