ORDINANCES
AND OUTLINES OF TESTS,
SYLLABI AND COURSES OF READING

FOR

BACHELOR OF COMPUTER APPLICATIONS (B.C.A)
Programme Code : BCAB3PUP

(SEMESTER SYSTEM)0

PART-I

(Semester 1st and 2nd)
FOR

SESSION 2024-25, 2025-26 & 2026-27

(This Scheme is for Regular students of Affiliated Colleges, Constituent Colleges and Centre for Distance & Online Education)

PUNJABI UNIVERSITY PATIALA

PUNJABI UNIVERSITY PATIALA
(Established under Punjab Act no. 35 of 1961)

SYLLABUS
BACHELOR OF COMPUTER APPLICATIONS

OUTLINE OF PAPERS AND TESTS
FOR
B.C.A. First Year(1st Semester)
Programme Code : BCAB3PUP
SESSION 2024-25, 2025-26 & 2026-27

Code	Title of Paper	Credit	Hours per Week	University Examination	Internal Assessment	Max. Marks	Exam. Duration Hours
BCAB1101T	General English – I	4	4	70	30*	100	3
BCAB1102T	Punjabi (Compulsory) -I or Punjabi Compulsory - I (Mudla Gyan) **	4	4	70	30	100	3
BCAB1103T	Fundamentals of Information Technology	4	4	70	30	100	3
BCAB1104T	Programming Fundamentals using C	4	4	70	30	100	3
BCAB1105L	Software Lab –I (GUI Based Operating System and Office Automation)	2	4	70	30	100	3
BCAB1106L	Software Lab – II (Based on paper BCAB1104T Programming Fundamentals using C)	2	4	70	30	100	3
		20	Total	420	180	600	

Note:
1.   The break up of marks for the internal assessment for theory/Practical except BCAB-1101T will be as under:

 i.   One or two tests out of which minimum one best will be   20 Marks
 considered for assessment.
 ii.   Attendance   5 Marks
 iii.   Class participation and behaviour   5 Marks

2.   The break up of marks for the internal assessment for BCAB1101T: General English – I will be as under:

 i.   Formal assessment through Interview/Self   15 Marks
 Introduction/Recitation etc.
 ii.   Conversation Skills (particularly listening and speaking to   5 Marks
 be evaluated through oral examination)
 iii.   Attendance   5 Marks
 iv.   Class participation and behaviour   5 Marks

** *Only those students who have not studied Punjabi up to matriculation can opt for Punjab Compulsory (Mudla Gyan). The code for the paper is same.*

OUTLINE OF PAPERS AND TESTS
FOR
B.C.A. First Year (2nd Semester)
Programme Code : BCAB3PUP

SESSION 2024-25, 2025-26 & 2026-27

Code	Title of Paper	Credit	Hours per Week	University Examination	Internal Assessment	Max. Marks	Exam. Duration Hours
BCAB1201T	General English – II	4	4	70	30*	100	3
BCAB1202T	Punjabi (Compulsory) - II or Punjabi Compulsory-II (Mudla Gyan) **	4	4	70	30	100	3
BCAB1203T	Digital Electronics	4	4	70	30	100	3
BCAB1204T	Data Structures	4	4	70	30	100	3
BCAB1205T	Basic Mathematics	4	4	70	30	100	3
BCAB1206L	Software Lab – III (based on BCAB1204T Data Structures)	2	4	70	30	100	3
BCAB1207T	Drug Abuse : Problem, Management and Prevention***		4	70	30	100	3
		22	Total	420	180	600	

Note:

1. The break up of marks for the internal assessment for theory/Practical except BCAB-1201T will be as under:

    i. One or two tests out of which minimum one best will be considered for assessment.   20 Marks

    ii. Attendance   5 Marks

    iii. Class participation and behaviour   5 Marks

2. The break up of marks for the internal assessment for BCAB1201T: General English – I will be as under:

    i. Formal assessment through Interview/Self Introduction/Recitation etc.   15 Marks

    ii. Conversation Skills (particularly listening and speaking to be evaluated through oral examination)   5 Marks

    iii. Attendance   5 Marks

    iv. Class participation and behaviour   5 Marks

** Only those students who have not studied Punjabi up to matriculation can opt for Punjab Compulsory (Mudla Gyan). The code for the paper is same.

*** BCAB1207T : Drug Abuse: Problem, Management and Prevention is a compulsory qualifying paper as per university guidelines, the marks for this paper are not counted for the total marks for the degree.

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BCAB1102T : **PUNJABI COMPULSORY**

AS APPROVED BY DEPARTMENT OF PUNJABI

AS APPROVED BY DEPARTMENT OF PUNJABI

BCAB1103T : FUNDAMENTALS OF INFORMATION TECHNOLOGY

Max Marks: 70   **Maximum Time: 3 Hrs.**
Min Pass Marks: 35%   **Lectures to be delivered: 45-55 Hrs**
Credit:4

Course Objectives
- Aware students about basic of computer and its evolution.
- Provide knowledge of different units of computer like processing unit, IO unit, and storage unit.
- Applications of IT.
- Advanced trends in IT.

Learning Outcome
On the successful completion of the course, students will be able to;
- Have a clear understanding of fundamentals of computers so as to apply it in real life
- problems.
- Develop an in depth knowledge of various motivational theories.
- Develop skills to get employment in I.T. field

Instructions for the paper setter
The question paper will consist of three sections, Sections A, B & C. Sections A & B will have four questions each from the respective sections of the syllabus. Each question will carry 12 marks, which may be segregated into sub-parts. Section C will be compulsory with 11 short answer type questions of 02 marks each, which will cover the entire syllabus.

Instructions for the candidates
Candidates are required to attempt two questions each from the sections A & B of the question paper and the entire section C.

SECTION A

Computer Fundamentals: Block diagram of a computer, characteristics of computers and generations of computers. Categories of Computers - Supercomputer, mainframe computer, network server, Workstation, Desktop computers, notebook computer, Tablet PC, handheld PC, smart phone.
Input Devices: Keyboard, Mouse, Joy tick, Track Ball, Touch Screen, Light Pen, Digitizer, Scanners, Speech Recognition Devices, Optical Recognition devices – OMR, OBR, OCR
Output Devices: Monitors, Impact Printers - Dot matrix, Character and Line printer, Non Impact Printers – DeskJet and Laser printers, Plotter.
Memories: Memory Hierarchy, Primary Memory – RAM, ROM, Cache memory. Secondary Storage Devices - Hard Disk, Compact Disk, DVD, Flash memory.
Software: Types of Software- System Software, Application Software, Firmware. Type of System Software: Operating Systems, Language Translators, Utility Programs,

Communications Software. **Commonly Used Application Software**: Word Processor, Spreadsheet, Database, Education, Entertainment Software.

Computer Languages: Machine language, assembly language, high level language, 4GL.

SECTION B

Number System: Non-positional and positional number systems, Base conversion, Concept of Bit and Byte, binary, decimal, hexadecimal, and octal systems, conversion from one system to the other. Binary Arithmetic: Addition, subtraction and multiplication, 1's complement, 2's complement, subtraction using 1's complement and 2's complement.

Computer Codes: weighted and non-weighted code, BCD, EBCDIC, ASCII, Unicode.

Computer Network: Network types, network topologies.

Internet Related Concepts: Internet, World Wide Web, Hypertext, Uniform Resource Locator, Web Browsers, IP Address, Domain Name, Internet Services Providers, Internet Security, Web Search Engine, Net Surfing, web portal, Wiki, Blog.

Advanced Trends in IT : Mobile Internet, GPS, 3G, 4G, Wi-Fi, Bluetooth, Cloud Technology, Virtual LAN Technology, Firewall, E-Commerce, M-Commerce, Nanotechnology, Virtual Reality, BPO and KPO, Online shopping, Social Media - YouTube, FaceBook, Linkedin, Twitter, Google+.

Applications of IT: IT in Business and Industry, IT in Education & training, IT in Science and Technology, IT and Entertainment, Current Trends in IT Application - AI, Virtual Reports, voice recognition, Robots, Multimedia Technology.

Reference Books:
1.   Peter Nortorn, Introduction to Computers, Seventh Edition
2.   V. Rajaraman, Fundamentals of Computers, PHI.
3.   Larry E. Long and Nancy Long, Computers: Information Technology in Perspective, PHI.
4.   N. Subramanian, Introduction to Computers, Tata McGraw-Hill.
5.   D.H. Sanders, Computers Today, McGraw- Hill.

Max Marks: 70   **Maximum Time: 3 Hrs.**
Min Pass Marks: 35%   **Lectures to be delivered: 45-55 Hrs.**
Credit:4

Course Objective
The course provides students with a detailed study of programming techniques using C programming language. Good programming habits, proper logical thinking, algorithm and flowchart development, writing efficient programs are taught in the course. Detailed lab exercises covering all aspects of the language are prepared.

Learning Outcome
- To analyze problems efficiently and develop comprehensive logic to solve it.
- To develop good algorithms and flowcharts to solve problems.
- To write C programs in a structured manner.

Instructions for the paper setter
The question paper will consist of three sections, Sections A, B & C. Sections A & B will have four questions each from the respective sections of the syllabus. Each question will carry 12 marks, which may be segregated into sub-parts. Section C will be compulsory with 11 short answer type questions of 02 marks each, which will cover the entire syllabus.

Instructions for the candidates
Candidates are required to attempt two questions each from the sections A & B of the question paper and the entire section C.

SECTION A

Programming Process: Problem definition, Algorithm development, Flowchart, Coding, Compilation and debugging.
Basic structure of C program: History of C, Structure of a C program, Character set, Identifiers and keywords, constants, variables, data types.
Operators and expressions: Arithmetic, Unary, Logical, Relational operators, assignment operators, Conditional operators, Hierarchy of operations type conversion.
Control statements: branching statements (if, if else, switch), loop statements (for, while and do-while), jump statements (break, continue, goto), nested control structures.
Functions: Library functions and user defined functions, prototype, definition and call, formal and actual arguments, local and global variables, methods of parameter passing to functions, recursion.
I/O functions: formatted & unformatted console I/O functions

SECTION B

Storage Classes: automatic, external, static and register variables.
Arrays: – One dimensional and two dimensional arrays
Declaration, initialization, reading values into an array, displaying array contents
Strings: input/output of strings, string handling functions (strlen, strcpy, strcmp, strcat & strrev), table of strings.
Structures and unions: using structures and unions, comparison of structure with arrays and union.
Pointers: pointer data type, pointer declaration, initialization, accessing values using pointers, pointers and arrays.
Introduction to Files in C: opening and closing files. Basic I/O operation on files.

Reference Books:

1   E. Balagurusamy, Programming in C, Tata McGraw-Hill.
2   Kernighan and Ritchie, The C Programming Language, PHI.
3   Byron Gotfried, Programming in C.
4   Kamathane, Programming in C, Oxford University Press.

BCAB1105L : SOFTWARE LAB – I
(GUI Based Operating System and Office Automation)

Max Marks: 100   **Maximum Time: 3 Hrs.**
Min Pass Marks: 35%   **Practical Sessions: 40-50 Hrs.**
Credit:2

This laboratory course will comprise the following list of practicals based on any GUI Based Operating System (Unix/Windows/Mac) and concepts of Office Automation.

List of Assignments

Operating System
    Activity 1: Operating System Installation and Software & Drivers installation.
    Activity 2: Basic components of GUI-Desktop, Icons, Taskbar, Status Bar, Wallpapers, Screen Saver
    Activity 3: Start Menu: Accessories- Notepad, Calculator, Clock, Date and Time, Disk Defragmentation, Working with Control Panel/Settings.
    Activity 4: Taskbar properties - Maximize Minimize, Restore, and Close.
    Activity 5: Creating Files, Folders, Shortcuts, Moving folders (right click options)

MS-Excel
    Activity 1:
        i.   Create, open, save and close workbook?
        ii. Create a new worksheet, renaming and moving sheet.
        iii. Entering, copying, moving and deleting data in cells and worksheets.
        iv. Insert and delete cells, columns and rows in MS-Excel.
    Activity 2:
        i.   Formatting of data in cells:-
        ii. Text formatting (font size, font style, font color, Cell border etc.)
        iii. Text Alignment
        iv. Text Orientation, Text Direction, Text Control.
    Activity 3:
        i.   Find and replace data in a sheet
        ii. Perform data sorting and data filtering in MS-Excel
        iii. Protect your Worksheet and Workbook?
        iv. Enter and perform some basic formulas in ms-excel.
    Activity 4:
        i.   Perform some basic Functions in MS-Excel.
        ii. Create a chart in MS-Excel.
        iii. Create different types of Charts in excel.
        iv. Set a size, margin, orientation of page in Ms-Excel.
        v.   The print properties of a worksheet in MS-Excel.
    Activity 5:
        i.   Hide and unhide row and column in MS-Excel
        ii. Set column width and row height in MS-Excel.
        iii. Adding text Box, header/footers, pictures and special symbols in your worksheet.
        iv. Arranging, splitting and hiding windows in MS-Excel. And also freezing panes.
        v.   Create and run Macros in MS-Excel.

MS-Word

Activity 1:
  i. Create, open, save and close a document.
  ii. Typing, copying, moving and deleting data in word document.
  iii. Perform Save and Save as, Cut and Copy, Paste and Paste Special.

Activity 2:

Formatting of data in word Document: -
  i. Text formatting (font size, font style, font color, subscript, superscript, upper/lower case etc.)
  ii. Text Alignment and character spacing
  iii. Indention and line spacing
  iv. Border and shading
  v. Bullets and Numbering

Activity 3:
  i. Find and replace and data sorting in a document.
  ii. Protect your document.
  iii. Add chart in word document. Create different types of Charts in word.
  iv. Set a size, margin, orientation of page, Hyphenation, Columns and Line Numbers in MS-Word.

Activity 4:
  i. Set Page Color, Page Border, Themes, and Watermarks in MS-Word
  ii. Adding Tables, header/footers, pictures, page numbers and special symbols, Text Box in your word document.
  iii. Showing Ruler, Gridlines, Document Map, Thumbnails, Inserting Word Art, Drop Cap, Hyperlink, Equation etc. in word document

Activity 5:
  i. Arranging, splitting windows in MS-word
  ii. Perform Mail-merge in MS-word
  iii. Create and run Macros in MS-Word
  iv. Set the print properties of a word document

PowerPoint

Activity 1:
  i. Create, open, save and close a Presentation
  ii. Typing, copying, moving and deleting data in presentation.
  iii. New Slide, understanding Slide Layout, adding and deleting slides.

Activity 2:

Formatting of data in slides:-
  i. Text formatting (font size, font style, font color, subscript, superscript, upper/lower case etc.)
  ii. Text Alignment and character spacing
  iii. Indention and line spacing
  iv. Border and shading
  v. Bullets and Numbering

Activity 3:
  i. Set a size, margin, orientation of slides in PowerPoint.
  ii. Adding Tables, header/footers, pictures, page numbers and special symbols, Text Box etc. in your presentation

Activity 4:
  i. Adding Animation and Transition Effects in Slides, Understanding Slide Show

ii. Presentation Views, Understanding Formatting commands in PowerPoint

Activity 5:

    i. Create and run Macros in PowerPoint

    ii. Arranging, splitting windows in MS-PowerPoint.

The breakup of marks for the practical will be as under

i.	Internal Assessment	**30 Marks**
ii.	Viva Voce (External Evaluation)	**30 Marks**
iii.	Lab Record, Program Development and Execution(External Evaluation)	**40 Marks**

BCAB1106L : SOFTWARE LAB – II
(Based on paper BCAB1104T : Programming Fundamentals using C)

Max Marks: 100	Maximum Time: 3 Hrs.
Min Pass Marks: 35%	Practical Sessions: 40-50 Hrs.
Credit:2	

This laboratory course will comprise as exercises to supplement what is learnt under paper BCAB1104T: Programming Fundamental using C. Students are required to develop the following programs with internal documentation:

1. Operators and data types in C
   a) Write a program to print the size of all the data types supported by C and its range.
   b) Write a program to convert temperature from Fahrenheit to Celsius.
   c) Write a program to find simple interest and compound interest.

2. Control statements
   a) Write a program to check whether the given number is a even number or not.
   b) Write a program to accept three numbers and find the largest among them.
   c) Write a program to count the different vowels in a line of text using switch.
   d) Write a program to accept two numbers and perform various arithmetic operations (+, -, *, /) based on the symbol entered.
   e) Write a program to find factorial of a number.
   f) Write a program to check whether a number is prime or not.
   g) Write a program to print all prime numbers between any 2 given limits.
   h) Write a program to check whether a number is palindrome or not.
   i) Write a program to print all the Armstrong numbers between any 2 given limits.

4. Arrays and strings
   a) Write a program to find largest element in an array.
   b) Write a program to find sum and average of numbers stored in an array.
   c) Write a program to check whether a string is a Palindrome.
   d) Write a program to perform matrix addition.
   e) Write a program to perform matrix multiplication.

6 Functions and recursion
   a) Write a program to find the roots of a quadratic equation using function.
   b) Write a recursive program to find the factorial of a number.
   c) Write a recursive program to find the nth Fibonacci number.

7. Structures and unions
a. Create an employee structure and display the same.
b. Create a student database storing the roll no, name, class etc and sort by name.

8. Pointers
a. Write a function to swap two numbers using pointers
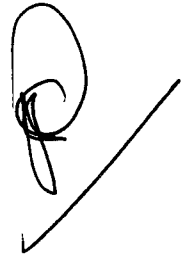b. Write a program to access an array of integers using pointers

9. Files
a. Create a file and store some records in it. Display the contents of the same. Count numbers of characters, words and lines in the file.

The breakup of marks for the practical will be as under

i.	Internal Assessment	30 Marks
ii.	Viva Voce (External Evaluation)	30 Marks
iii.	Lab Record, Program Development and Execution(External Evaluation)	40 Marks

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BCAB1202T : **PUNJABI COMPULSORY - II**

(AS APPROVED BY DEPARTMENT OF PUNJABI)

BCAB1203T : DIGITAL ELECTRONICS

Max Marks: 70
Min Pass Marks: 35%
Credit:4

Maximum Time: 3 Hrs.
Lectures to be delivered: 45-55 Hrs.

Course Objectives:
- To introduce the fundamentals of computers
- To introduce basic postulates of Boolean algebra and shows the correlation between
- Boolean expressions
- To introduce the methods for simplifying Boolean expressions
- To outline the formal procedures for the analysis and design of combinational circuits
- and sequential circuits
- To introduce the concept of computer memories

Learning Outcome:
After learning the course the students should be able to explain about the fundamentals of computers, digital number systems and logic circuits. The student should be able to solve logic function minimization. The students should be able to differentiate between combinational and sequential circuits such as decoders, encoders, multiplexers, de-multiplexers, flip-flops, counters, registers. The students should be able state the specifications of logic families. The student should be able to explain the different types of computer memories.

Instructions for the paper setter
The question paper will consist of three sections, Sections A, B & C. Sections A & B will have four questions each from the respective sections of the syllabus. Each question will carry 12 marks, which may be segregated into sub-parts. Section C will be compulsory with 11 short answer type questions of 02 marks each, which will cover the entire syllabus.

Instructions for the candidates
Candidates are required to attempt two questions each from the sections A & B of the question paper and the entire section C.

SECTION-A
Fundamental Concepts: Introduction to Analog and Digital Systems, Digital Signals, Basic Digital Circuits: AND, OR, NOT, NAND, NOR, XOR and XNOR gates. Boolean algebra theorems, Characteristics of Digital IC.

Number Systems: Positional and Non-positional number systems, Binary, Decimal, Octal and Hexadecimal, Base conversions, Binary arithmetic: Addition and Subtraction, 1's complement, 2's complement, subtraction using 1's complement and 2's complement.

Combinational Logic Design: SOP and POS Representation of Logic functions, K-Map representation and simplification up to 4 variable expressions, Don't care condition.

SECTION – B

Multiplexers: 4X1, 8X1 and 16X1. De-multiplexers: 1 to 4, 1 to 8 and 1 to 16. BCD to Decimal decoder, Decimal to BCD encoder. Parity generator and Parity checker. Design of Half adder and Full adder

Flip-Flops: Introduction, Latch, Clocked S-R Flip Flop, Preset and Clear signals, D-Flip Flop, J-K Flip Flop, The race-around condition, Master Slave J-K Flip Flop, D-Flip-Flop, Excitation Tables of Flip Flops. Edge-Triggered Flip Flops.

A/D and D/A Converters: Introduction, Digital to Analog Converters: Weighted-Register D/A converter, R-2R Ladder D/A converter. Analog to Digital Converters: Quantization and encoding, Parallel-comparator A/D converter, Counting A/D converter.

Reference Books:
1. Modern Digital Electronics by R. P. Jain, Fourth Edition, TMH
2. Digital Principles and Applications by Albert Paul Malvino and Donald P. Leach, Fourth Edition, TMH
3. Digital Electronics: An Introduction to Theory and Practice by William H Gothmann, 2nd Edition, PHI
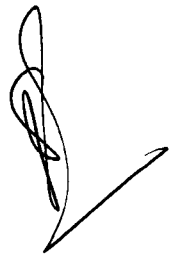
BCAB1204T : DATA STRUCTURES

Max Marks: 70
Min Pass Marks: 35%
Credit:4

Maximum Time: 3 Hrs.
Lectures to be delivered: 45-55 Hrs.

Course Objective
- To give fundamental knowledge data type various data structure.
- To explain the basic concepts of searching and graph theories.
- To make the learners acquainted with the use of different theories.

Learning Outcome
- Understand the need for Data Structures when building Applications.
- Appreciate the need for optimized algorithm.
- Able to walk through insert and delete for different data techniques.
- Improve programming skills.

Instructions for the paper setter
The question paper will consist of three sections, Sections A, B & C. Sections A & B will have four questions each from the respective sections of the syllabus. Each question will carry 12 marks, which may be segregated into sub-parts. Section C will be compulsory with 11 short answer type questions of 02 marks each, which will cover the entire syllabus.

Instructions for the candidates
Candidates are required to attempt two questions each from the sections A & B of the question paper and the entire section C.

SECTION A
Basic concepts and notations: Types of data structures, Data structure operations, Mathematical notations and functions, Algorithmic complexity, Big 'O' notation, Time and space trade off.
Arrays: Linear array, representation of array in memory, traversing linear array, insertion and deletion in an array, Two-dimensional array, row major and column major orders, sparse matrix.
Stacks: Representation of stacks in memory (linked and sequential), operations on stacks, Applications of stacks: string reversal, parentheses matching.
Queues: Representation of queues in memory (linked and sequential), operations on queues, insertion in rear, deletion from front.

SECTION B
Linked list: Representation of linked list using static and dynamic data structures, insertion and deletion of a node from linked list, searching in link list, searching in sorted link list.
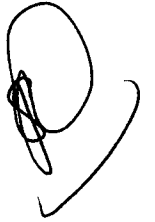**Trees:** Definition and basic concepts, linked representation and representation in contiguous storage, binary tree, binary tree traversal, Binary search tree, searching, insertion and deletion in binary search tree.
Searching and sorting algorithms: Linear and binary search, bubble sort, insertion sort, selection sort, quick sort, merge sort.

Reference Books

1. Seymour Lipschutz, Theory and Practice of Data Structures, McGraw-Hill.
2. Vishal Goyal, Lalit Goyal, Pawan Kumar, A Simplified Approach to Data Structures, Shroff Publications.
3. Y. L. Tenenbaum, and A. J. Augenstein, Data Structures using C and C++, PHI.
4. Robert Sedgewick, Algorithms in C, Pearson Education.

BCAB1205T : BASIC MATHEMATICS

Max Marks: 70

Min Pass Marks: 35%

Credit:4

Maximum Time: 3 Hrs.

Lectures to be delivered: 45-55 Hrs.

Course Objective
- To give fundamental knowledge of set theories,abstract algebra.
- To explain the basic concepts of matrices,trigonometry.
- To make the learners acquainted with the use of Calculus and vector analysis

Learning Outcome
On the successful completion of the course, students will be able to;
- Have a clear understanding of Mathematical functions.
- Develop an in depth knowledge of Mathematical theories.
- Develop skills to get employment in I.T and Analysis Field

Instructions for the paper setter
The question paper will consist of three sections, Sections A, B & C. Sections A & B will have four questions each from the respective sections of the syllabus. Each question will carry 12 marks, which may be segregated into sub-parts. Section C will be compulsory with 11 short answer type questions of 02 marks each, which will cover the entire syllabus.

Instructions for the candidates
Candidates are required to attempt two questions each from the sections A & B of the question paper and the entire section C. Non Programmable Scientific Calculator is allowed.

SECTION A

Complex Numbers: Complex Numbers in the form of a+ib, Real and Imaginary parts of a complex number, Complex conjugate, algebra of complex numbers, square roots of a complex number, cube roots of unity.

Quadratic Equations: Solutions of Quadratic equations (with real and complex coefficients), Relations between roots and coefficients, Nature of roots, Equations reducible to quadratic equations.

Cartesian System of Rectangular Coordinates: Cartesian coordinate system, distance formula, section formula, centroid and incentre, area of triangle, condition for collinearities of three points in a plane.

Straight Line: Slope of a line, parallel and perpendicular lines, Equation of line in different forms, distance of a point from a line.

Circle: Standard form of equation of circle, General form, diameter form, three point form, Intersection of a line and a circle.

SECTION B

Matrices: Types of Matrices, Addition, Subtraction, Multiplication, Transpose, Conjugate and their properties, Symmetric, Skew-symmetric, Minor, co-factors, Adjoint, Inverse of matrices, Solution of linear system of equations using matrices.

Rank of a matrix, consistency of linear system of equations,

Determinants: Expansion of determinants (upto order 4), solution of linear system of equations using Cramer rule.

Reference Books:
1. NCERT Textbooks of Mathematics for +1 and +2.
2. M K. Jain, S.R.K. Iyengar and R.K. Jain," Numerical Methods for Scientific and Engineering Computation", Wiley.
3. B. S. Grewal, Higher Engineering Mathematics", Khanna Publishers.
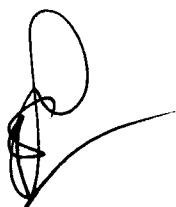
BCAB1206L : SOFTWARE LAB – III
(Based on paper BCAB1204T : Data Structures)

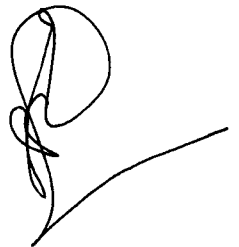**Max Marks: 100***   **Maximum Time: 3 Hrs.**
Min Pass Marks: 35%   **Practical Sessions 4 hours per week.**
Credit:2

This laboratory course will comprise as exercises to supplement what is learnt under paper BCAB1204T: Data Structures. Students are required to develop following programs in C language with internal documentation

1   Program to insert an element in an array.
2   Program to delete an element from an array.
3   Program to store an array using sparse representation.
4   Program to apply various operations on stack.
5   Program for parenthesis matching using stack.
6   Program for String reversal using stack.
7   Program to insert and delete nodes in a queue.
8   Program to insert and delete nodes in a linked list.
9   Program to search a node in a linked list.
10   Program to insert or delete node in a binary tree.
11   Program to traverse binary tree.
12   Program for implementing linear search.
13   Program for implementing binary search.
14   Program for implementing Bubble sort.
15   Program for implementing Selection sort.
16   Program for implementing Insertion sort.
17   Program for implementing Quick sort.
18   Program for implementing Merge sort.

***The breakup of marks for the practical will be as under**

i.	Internal Assessment	30 Marks
ii.	Viva Voce (External Evaluation)	30 Marks
iii.	Lab Record, Program Development and Execution(External Evaluation)	40 Marks

BCAB1207T : Drug Abuse : Problem, Management and Prevention *

To be Provided by Department of pharmaceutical & Drugs.