ORDINANCES
AND OUTLINES OF TESTS,
SYLLABI AND COURSES OF READING

FOR

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

(SEMESTER SYSTEM)

PART-I

(Semester 1st and 2nd)
FOR
For 2021-22 SESSION

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

For 2021-22 SESSION

Code	Title of Paper	Hours per Week	University Examination	Internal Assessment	Max. Marks	Exam. Duration Hours
BCAB1101T	General English – I	4	75	25*	100	3
BCAB1102T	Punjabi (Compulsory) or Punjabi Compulsory (Mudla Gyan) **	4	75	25	100	3
BCAB1103T	Fundamentals of Information Technology	4	75	25	100	3
BCAB1104T	Programming Fundamentals using C	4	75	25	100	3
BCAB1105L	Software Lab –I (Windows and Office Automation)	4	60	40	100	3
BCAB1106L	Software Lab – II (Based on paper BCAB1106T Programming Fundamentals using C)	4	60	40	100	3
		Total	**420**	**180**	**600**	

Note:

1. The break up of marks for the practical will be as under:
   - i. Internal Assessment — 40 Marks
   - ii. Viva Voce (External Evaluation) — 20 Marks
   - iii. Lab Record Program Development and Execution(External Evaluation) — 40 Marks
2. The break up of marks for the internal assessment for theory except BCA-111 will be as under:
   - i. One or two tests out of which minimum one best will be considered for assessment. — 15 Marks
   - ii. Attendance — 5 Marks
   - iii. Class participation and behaviour — 5 Marks

*The break up of marks for the internal assessment for BCA-111: General English – I will be as under:

- i. Formal assessment through Interview/Self Introduction/Recitation etc. — 10 Marks
- ii. Conversation Skills (particularly listening and speaking to be evaluated through oral examination) — 5 Marks
- iii. Attendance Class participation and behaviour — 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

For 2021-22 SESSION

Code	Title of Paper	Hours per Week	University Examination	Internal Assessment	Max. Marks	Exam. Duration Hours
BCAB1201T	General English – II	4	75	25*	100	3
BCAB1202T	Punjabi (Compulsory) or Punjabi Compulsory (Mudla Gyan) **	4	75	25	100	3
BCAB1203T	Digital Electronics	4	75	25	100	3
BCAB1204T	Data Structures	4	75	25	100	3
BCAB1205T	Basic Mathematics	4	75	25	100	3
BCAB1206L	Software Lab – III (based on ~~BCA-124~~ BCAB-1204: Data Structures)	4	60	40	100	3
BCAB1207T	Drug Abuse : Problem, Management and Prevention***	4	70	30	100	3
		Total	**435**	**165**	**600**	

Note:

1. The breakup of marks for the practical will be as under:
   i. Internal Assessment — 40 Marks
   ii. Viva Voce (External Evaluation) — 20 Marks
   iii. Lab Record Program Development and Execution(External Evaluation) — 40 Marks

2. The breakup of marks for the internal assessment for theory papers except BCA-121 will be as under:
   i. One or two tests out of which minimum one best will be considered for assessment. — 15 Marks
   ii. Attendance Class participation and behaviour — 5 Marks
   iii. Class participation and behaviour — 5 Marks

*The breakup of marks for the internal assessment for BCA-121: General English – II will be as under:
   i. Formal assessment through Interview/Self Introduction/Recitation etc. — 10 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 Punjabi 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.

ORDINANCES
(FOR B.C.A. UNDER THE +3 SCHEME)

Applicability of Ordinances for the time being in force

Notwithstanding the integrated nature of a course spread over more than one academic year, the ordinances in force at the time a student joins a course shall hold good only for the examination held during or at the end of the academic year. Nothing in these Ordinances shall be deemed to debar the University from amending the ordinances subsequently and the amended ordinances, if any, shall apply to all the students whether old or new.

1. B.C.A. is an integrated course comprising three parts spread over three years. Each part will consist of two semesters. The course of study of B.C.A. shall be divided in six semesters and university examination will be held at the end of every semester in the months of November/December (for semester I, III & V) and May/June (for semester II, IV & VI) or as fixed by the Academic Council.

2. A candidate must complete and pass the whole course of three years within a maximum of five years from the date of admission in B.C.A. first semester.

3. The outlines of tests and syllabi shall be such as prescribed by the Academic Council from time to time.

4. A candidate will be eligible to join 1st semester of B.C.A course, if he/she has passed +2 examination of Punjab School Education Board, or any other examination recognised as equivalent thereto without reappear.

5. Semester examination will be open to regular candidates who have been on the rolls of a college affiliated to this University and meet the attendance and other requirements as prescribed in the Ordinances No.7

6. Subject to fulfilment of requirement of House examinations, the attendance requirements and these ordinances there will be no condition of passing papers for promotion from odd semester to even semester in an Academic Session.

   To qualify for admission to 2nd year of the Course, the candidate must have passed 50% of total papers of the two semesters of the 1st year. Similarly, to qualify for admission to 3rd year of the course, the candidate should have passed 50% of total papers of four semesters of the earlier two years.

   A candidate placed under reappear in any paper, will be allowed two chances to clear the reappear, which should be availed within consecutive two years/chances i.e. to pass in a paper the candidate will have a total of three chances, one as regular student and two as reappear candidate.

   The examination of reappear papers of odd semester will be held with regular examination of the odd semester and reappear examination of the even semester will be held with regular examination of even semester. But if a candidate is placed under reappear in the last semester of the course, he will be provided chance to pass the reappear with the examination of the next semester, provided his reappear of lower semester does not go beyond next semester.

7. **Attendance Requirements:** Every candidate will be required to attend a minimum of 75% lectures delivered to that class in each paper as well as 75% of the laboratory work,

seminars etc. separately, provided that a deficiency in attendances may be condoned for special reasons, as per the relevant ordinances on the subject.

8. To be eligible to appear in the semester examination a candidate must have obtained in the house examination at least 25% marks in each paper; 33% marks in the aggregate of all subjects of the semester. The Principal at his discretion may allow a special test to a candidate who could not appear in the House examination owing to unavoidable reasons or fails to secure the minimum marks as prescribed above.

9. **Late College Students**: A candidate who has completed the prescribed course of instructions for a semester but has not appeared in the examination or having appeared, has failed in the examination, may appear as a late college student within the prescribed period.

10. The pass and reappear students of B.C.A Part-I and II from Panjab University, Guru Nanak Dev University and Punjab Technical University shall be treated at par with the corresponding students of this University. But in case such a student is admitted in B.C.A semester III or V in this University, he/she will be required to clear deficient papers, if any.

11. Amount of examination fee to be paid by a candidate for each semester shall be as fixed by the University from time to time.

12. Applications for admission to the examination shall be made on the prescribed form attested by the competent authority as per University rules. The last date by which admission forms and fees must reach the Registrar shall be as follows:

	Without late fee	With Rs. 800/- Late fee	With Rs. 1200/- Late fee	With Rs. 5000/- Late fee	With Rs. 10,000/- Late fee
December/January	30th September	15th October	21st October	31st October	10th November
April/May	28th February	15th March	21st Mach	31st March	15th April

13. University medal will be awarded to a candidate who secured first position in the University on the basis of the marks of all the six semesters taken together. The general rules and conditions of the University for the award of medal/prizes etc. will be applicable in the award of University medal to the topper of this examination.

14. The medium of instructions and examination will be English except for the Punjabi papers.

15. In each Paper 25% of the total marks are assigned to the internal assessment and 75% marks to the University examination.

16. The minimum number of marks required to pass the examination in each Part shall be 35% in each subject, provided that in subject with practical the percentage shall be required separately in written and practical/lab work. The candidate shall also be entitled to grace marks as admissible under the ordinances relating to the `**GENERAL GRACE MARKS**`.

17. The successful candidates shall be classified on the basis of aggregate marks secured in all the six semesters of B. C. A. taken together as under:

    (a) 75% or more with Distinction.

(b) 60% or more in the First division.
(c) 50% or more but less than 60% in the Second division.
(d) below 50% in the Third division.

AS APPROVED BY DEPARTMENT OF ENGLISH

BCAB1102: PUNJABI COMPULSORY
AS APPROVED BY DEPARTMENT OF PUNJABI

BCAB1102 : ਪੰਜਾਬੀ ਲਾਜ਼ਮੀ (ਮੁੱਢਲਾ ਗਿਆਨ)

AS APPROVED BY DEPARTMENT OF PUNJABI

BCAB1103: FUNDAMENTALS OF INFORMATION TECHNOLOGY

Max Marks: 75 **Maximum Time: 3 Hrs.**
Min Pass Marks: 35% **Lectures to be delivered: 45-55 Hrs**

Instructions for the paper setter
The question paper will consist of three sections: A, B & C. SECTIONs A & B will have four questions each from the respective sections of the syllabus carrying 15 marks for each question. SECTION C will have 5-10 short-answer type questions carrying a total of 15 marks, which will cover the entire syllabus uniformly.

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.

BCAB1104: PROGRAMMING FUNDAMENTALS USING C

Max Marks: 75 **Maximum Time: 3 Hrs.**
Min Pass Marks: 35% **Lectures to be delivered: 45-55 Hrs.**

Instructions for the paper setter
The question paper will consist of three sections: A, B & C. SECTIONs A & B will have four questions each from the respective sections of the syllabus carrying 15 marks for each question. SECTION C will have 5-10 short-answer type questions carrying a total of 15 marks, which will cover the entire syllabus uniformly.

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.

BCAB1105: SOFTWARE LAB – I
(Windows and Office Automation)

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

This laboratory course will comprise the following list of practicals based on Windows and concepts of Office Automation.

List of Assignments

Windows 7

Activity 1: Windows 7 Installation and Software & Drivers installation.
Activity 2: Basic components of Window-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.
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**	**40 Marks**
ii.	**Viva Voce (External Evaluation)**	**20 Marks**
iii.	**Lab Record, Program Development and Execution(External Evaluation)**	**40 Marks**

BCAB1106: SOFTWARE LAB – II

(Based on paper BCAB1104: Programming Fundamentals using C)

Max Marks: 100 **Maximum Time: 3 Hrs.**

Min Pass Marks: 35% **Practical Sessions: 40-50 Hrs.** BCAB1104

This laboratory course will comprise as exercises to supplement what is learnt under paper ~~BCA-114~~: 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**	**40 Marks**
ii.	**Viva Voce (External Evaluation)**	**20 Marks**
iii.	**Lab Record, Program Development and Execution(External Evaluation)**	**40 Marks**

AS APPROVED BY DEPARTMENT OF ENGLISH

BCAB1202 : PUNJABI COMPULSORY

(AS APPROVED BY DEPARTMENT OF PUNJABI)

BCAB1202 : ਪੰਜਾਬੀ ਲਾਜ਼ਮੀ (ਮੁੱਢਲਾ ਗਿਆਨ)

AS APPROVED BY DEPARTMENT OF PUNJABI

BCAB1203: DIGITAL ELECTRONICS

Max Marks: 75 **Maximum Time: 3 Hrs.**
Min Pass Marks: 35% **Lectures to be delivered: 45-55 Hrs.**

Instructions for the paper setter

The question paper will consist of three sections: A, B & C. SECTIONs A & B will have four questions each from the respective sections of the syllabus carrying 15 marks for each question. SECTION C will have 5-10 short-answer type questions carrying a total of 15 marks, which will cover the entire syllabus uniformly.

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

BCAB1204: DATA STRUCTURES

Max Marks: 75 **Maximum Time: 3 Hrs.**
Min Pass Marks: 35% **Lectures to be delivered: 45-55 Hrs.**

Instructions for the paper setter
The question paper will consist of three sections: A, B & C. SECTIONs A & B will have four questions each from the respective sections of the syllabus carrying 15 marks for each question. SECTION C will have 5-10 short-answer type questions carrying a total of 15 marks, which will cover the entire syllabus uniformly.

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.

BCAB1205: BASIC MATHEMATICS

Max Marks: 75 **Maximum Time: 3 Hrs.**
Min Pass Marks: 35% **Lectures to be delivered: 45-55 Hrs.**

Instructions for the paper setter
The question paper will consist of three sections: A, B & C. SECTIONs A & B will have four questions each from the respective sections of the syllabus carrying 15 marks for each question. SECTION C will have 5-10 short-answer type questions carrying a total of 15 marks, which will cover the entire syllabus uniformly.

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.

BCAB1206: SOFTWARE LAB – III
(Based on paper BCAB1204: Data Structures)

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

This laboratory course will comprise as exercises to supplement what is learnt under paper BCA-124: 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**	**40 Marks**
ii.	**Viva Voce (External Evaluation)**	**20 Marks**
iii.	**Lab Record, Program Development and Execution(External Evaluation)**	**40 Marks**

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