Bachelor of Computer Application (BCA)

Programme Code: SCW02BCA

SYLLABUS

(As per NEP 2020 Guidelines)

Sunbeam College for Women

Autonomous Post Graduate College | Accredited 'A' Grade by NAAC

BHAGWANPUR, VARANASI-221005 (U.P.)

SUNBEAM COLLEGE FOR WOMEN
BHAGWANPUR VARANASI

EVALUATION SCHEME & SYLLABUS

FOR

BACHELOR OF COMPUTER APPLICATION
(BCA)
(Three Year Course)

As per
NEP MODEL CURRICULUM
(Effective from the Session: 2024-25)

PROGRAM OUTCOME

BCA (BACHELOR OF COMPUTER APPLICATION)
(Three Year Course)

Program Outcome

BCA is catering to the need of students aspiring to excel in the field of Information Technology. This program is extended to six semesters each with the duration of six months. In this program, a student gets diversified knowledge on IT Management, Financial Accounting, Operational research, e-commerce etc. In the six semesters each student is required to undertake a 'project' and work for a period of 4-6 weeks and submit a report after the completion of the project. This provides an opportunity to the student to tackle real- life problems.

Program Specific Outcome

- Ability to understand and work upon the Database management system, Data warehousing and data mining.
- Ability to understand the architecture of computer and work on application software.
- Ability to understand the basic concept of business transactions, financial accounting and management.
- Gain an understanding on the importance of security, privacy, and ethical issues as they relate to E-Commerce.
- Use of statistical tools and technique to analyze and interpret on quantitative and qualitative data.
- Analyze and develop computer programs in the areas related to application software, web design and networking for efficient design of computer-based system.
- Apply the knowledge of mathematics, science, engineering fundamentals to the solution of complex engineering problems and decision-making problems.

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BCA (BACHELOR OF COMPUTER APPLICATION)
BCA FIRST YEAR (2024-25)

SEMESTER-I

Sr. No.	Subject Code	Subject Name	Paper Discipline	Sessional	ESE	Total	Credit
1.	BCA-24-101	Fundamental of Mathematics	Major	25	75	100	6
2.	BCA-24-102	Fundamentals of Computer Application	Major	25	75	100	6
3.	BCA-24-103T	Programming in C	Major	25	75	100	4
4.	BCA-24-103P	Programming in C Lab	Major	25	75	100	2
5.	BCA-24-104ME1	Principles of management	Minor Elective	25	75	100	4
6.	BCA-24-104ME2	Emerging Information technology	Minor Elective	25	75	100	4
7.	BCA-24-105VC	Office Automation	Vocational	-	100	100	3

SEMESTER-II

Sr. No.	Subject Code	Subject Name	Paper Discipline	Sessional	ESE	Total	Credit
1.	BCA-24-201	Business Communication	Major	25	75	100	6
2.	BCA-24-202	Discrete Math	Major	25	75	100	6
3.	BCA-24-203T	Data structure using C	Major	25	75	100	4
4.	BCA-24-203P	Data structure Lab	Major	25	75	100	2
5.	BCA-24-204ME1	Organizational Behaviour	Minor Elective	25	75	100	4
6.	BCA-24-204ME2	Object Oriented Programming Using C++	Minor Elective	25	75	100	4
7.	BCA-24-205VC	Web Designing	Vocational	-	100	100	3

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BCA-24-101: Fundamentals of Mathematics

Course Outcome:

CO 1: Define and illustrate the concepts related to Mathematics
CO 2: Make use of the knowledge of mathematics for examining various theorems
CO 3: Determine the effectiveness of different theorems and construct effective solution for mathematical problems

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	DETERMINANTS: Definition, Minors, Cofactors, Properties of Determinants, MATRICES: Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication and Multiplication of Matrices, Adjoint, Inverse, Cramers Rule, System of linear equation.	**30**
II	DIFFERENTIATION: Definitions: Constant, Variable and Functions, Derivative, Derivatives of Sum, Differences, Product & Quotients, Chain Rule, Derivatives of Composite Functions, Logarithmic Differentiation, Maxima & Minima	**15**
III	INTEGRATION: Integral as Limit of Sum, Fundamental Theorem of Calculus (without proof.), Indefinite Integrals, Methods of Integration: Substitution, By Parts, Partial Fractions, Gamma and Beta Functions(definition).	**15**
IV	3D COORDINATE GEOMETRY 3D Coordinate Geometry: Coordinates in Space, Direction Cosines, Angle Between Two Lines, Projection of Join of Two Points on a Plane, Equations of Plane, Straight Lines, Conditions for a line to lie on a plane, Conditions for Two Lines to be Coplanar, Shortest Distance Between Two Lines.	**30**

Reference Books:

1. B.S. Grewal, "Elementary Engineering Mathematics", 34th Ed., 1998.
2. Shanti Narayan, "Integral Calculus", S. Chand & Company, 1999
3. H.K. Dass, "Advanced Engineering Mathematics", S. Chand & Company, 9th Revised Edition, 2001.
4. Shanti Narayan, "Differential Calculus", S.Chand & Company, 1998.

BCA-24-102: Fundamentals of Computer Application

Course Outcome:

CO 1: Demonstrate the knowledge of the basic structure, components, features and generations of computers.

CO 2: Compare and contrast features, functioning & types of operating system and computer networks.

CO 2: Understanding the concept and implications of Number System.

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	INTRODUCTION TO COMPUTER: Computer Definition, Characteristics of Computers, Evolution of Computers & its applications, Block diagram of computer, IT tools and their applications, Types of Computers, Basic Organization of a Digital Computer, Hardware and Software, Application Software, Systems Software, Utility Software, Open source and Proprietary Software.	**20**
II	NUMBER SYSTEM: Representation of numbers and characters in computers. Binary, Hexadecimal, Octal, BCD, ASCII, EDCDIC and Gray codes, Conversion of bases, Number System Arithmetic's.	**25**
III	OPERATING SYSTEM: Basics of Operating System, Functions of Operating System, Types of Operating System. Dos – History, Files and Directories, Internal and External Commands, Batch Files, Types of O.S. Overview of Windows and Linux Operating system and its User Interface and differences. PROGRAMMING LANGUAGE TOOLS: Assembler, Compiler, Interpreter, Linker and Loader	**15**
IV	INTRODUCTION TO INTERNET AND WWW: Basic of Computer Networks, Local Area Network (LAN), Metropolitan area Network (MAN), Wide Area Network (WAN), Network Topology, Internet, Concept of Internet & WWW, Applications of Internet, Website Address and URL, Introduction to IP Address, ISP and Role of ISP, Internet Protocol, Modes of Connecting Internet (Hotspot, Wi-Fi, LAN Cable, Broadband, USB Tethering). EXPLORING THE INTERNET: Surfing, Popular Search Engines, Searching, Downloading, Printing.	**30**

Reference Books:

1. V. Rajaraman, Introduction to Information Technology, PHI Learning; 3rd edition, 2018
2. Pramod Kumar, Anuradha Tomar, R. Sharmila, "Emerging Technologies in Computing - Theory, Practice, and Advances", Chapman and Hall / CRC, 1st Edition, 2021, eBook ISBN: 9781003121466.
3. "Emerging Information Technologies: Improving Decisions, Cooperation, and Infrastructure" by Kenneth E. Kendall

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BCA-24-103T: Programming in C

Course Outcome:

CO 1: Apply the concept of procedural programming language using C programming

CO 2: Plan and analyze the real-world problems using C programming concepts

CO 3: Create the solution of the real-world problems and improve it as per industry standards

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	Overview of C: History and importance of C, Basic structure of C program, Comments, Concept of header files, Preprocessor directives: #include, #define. Constants, Variable and Data Types: Introduction, Character Set, C Tokens, Keywords and Identifiers, Constants, Variables, Data Types, Declaration of Variables, Assigning values to variables. Managing Input and Output Operations: Reading a Character, Writing a Character, Formatted Input, Formatted Output. Operators and Expressions: Introduction, Arithmetic Operators, Relational Operators, Logical Operators, Unary Operators, Binary Operators, Ternary Operator, Assignment Operators, Increment and Decrement Operators, Arithmetic Expressions, Evaluation of Expressions, Type Conversions in Expressions, Operator Precedence and Associativity. Decision making structures: If, If-else, Nested If-else, Switch-case statements, Difference between if-else switch-case. Loop Control structures: While loop, Do-while loop, for loop, Nested loop, Difference between while and do-while loop. Other statements: break, continue, goto, exit and return.	**20**
II	Arrays: One-dimensional Arrays, Declaration of One-dimensional Arrays, Initialization of One-dimensional Arrays, Example programs- Bubble sort, Selection sort, Linear search, Binary search, Two-dimensional Arrays, Declaration of Two-dimensional Arrays, Initialization of Two-dimensional Arrays, Example programs-Matrix Addition/Multiplication, Transpose of a matrix., Memory representation of array [Row Major, Column Major] Character Arrays and Strings: Declaring and Initializing String Variables, Reading Strings from Terminal, Writing Strings to Screen, Arithmetic Operations on Characters, String-handling Functions, Example Programs (with and without using built-in string functions) User-defined Functions: Introduction, Defining Function, Function prototyping, Function Calls (call by value and call by reference), Passing Arrays to Functions, Recursion. Storage Class: The Scope, Visibility and Lifetime of variables.	**15**
III	Pointers: Introduction, Defining Pointer variables, Initialization of Pointer variables, accessing a Variable through its Pointer, Pointer of pointer, Arithmetic operation on pointer variable, Array and pointer, Pointer to function, Command line arguments, Dynamic memory allocation.	**10**

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	Structures: Introduction, defining a structure, defining structure variables, accessing structure members, array of structures, pointer of structure. Union: Introduction, defining union, defining union variables, accessing union members, Difference between structure and union.	
IV	Bitwise Operators: Bitwise operators, Bit masking, bit field. File handling: Introduction, Operations on file, Opening modes of files, Standard function: fopen(), fclose(), feof(), Handling text files: fgetc(), fputc(), fscanf(), fprintf(), fgets(),fputs(), Handling binary files: fread(), fwrite(), Direct access: fseek(),ftell(), fewind().	**15**

Reference Books:

- *Let us C-Yashwant Kanetkar.*
- *Programming in C -Balguruswamy*
- *The C programming Language – Dennis Ritchie*
- *Structured programming approach using C-Forouzah & Ceilberg Thomson learning Publication.*

BCA-24-103P: Programming in C Lab

Course Outcome:

CO 1: Apply the concept of procedural programming language using C programming
CO 2: Plan and analyse the real-world problems using C programming concepts
CO 3: Create the solution of the real-world problems and improve it as per industry standards

Practical Exercises:

1. Write a program to calculate simple interest.
2. Write a program to swap the value of two variables.
3. Write a program to swap the value of two variables without taking any third variable.
4. Write a program to check the leap year.
5. Write a program to check given number is negative of positive.
6. Write a program to check given number is odd or even.
7. Write a program to check greatest number from given three numbers.
8. Write a program to print month name of a given month number.
9. Write a program to check given character is vowel, consonant, digits or special character.
10. Write a program to print the table of a given number.
11. Write a program to print factorial of a given number.
12. Write a program to display any digit(n) from 0-9 represented as a "7 segment display".

    For example:
    input : 5
    output :

13. Write a program to print the following format:-

a.
```
1
12
123
1234
```

b.
```
1234
123
12
1
```

14. a.
```
*
**
***
****
```

b.
```
****
***
**
*
```

15. a.
```
4
34
234
1234
```

b.
```
4321
432
43
4
```

16. a.
```
4
43
432
4321
```

b.
```
*
***
*****
*******
```

17. a.
```
1
121
```

b.
```
A
ABA
```

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12321 ABCBA

1234321 ABCDCBA

18. Write a program to check given number is prime or not.
19. Write a program to print all prime numbers from 1 to 500
20. Write a program to print Fibonacci series.
21. Write a program to calculate the compound interest.
22. Write a program to print the sum of each digits of a given number.
23. Write a program to reverse the digits of a given number.
24. Write a program to check given number is palindrome or not.
25. Write a program to print the sum of first and last digits of a given number.
26. Write a program to print the result of a^b for the given value of variable a and b.
27. Write a program to check the given number is perfect number of not.
28. Write a program to check the given number is Armstrong or not.
29. Write a program to convert decimal number to binary number
30. Write a program to print Pascal triangle.
31. Write a program to print the GCD(HCF) and LCM of two given numbers.
32. Write a program that prompts user to input value in an array of integer type and print the reverse of that array.
33. Write a program to search a value in an array and print its position (index) if it is found otherwise print -1.
34. Write a program to find greatest number in a given array.
35. Write a program to find the position of a character in a string.
36. Write a function to convert a string in small case.
37. Write a function to convert a string in title case.
38. Write a program that prompts user to input a string and find the following in that string:-
    - Number of vowels.
    - Number of consonants.
    - Number of digits.
    - Number of special characters.
39. Write a program that prompts user to input a string and find number of words in the string. Words can be separated by more than one spaces and any other punctuation marks.
40. Write a function to sort an array using bubble sort technique.
41. Write a function to sort an array using selection sort technique.
42. Write a program to print transpose of a matrix.
43. Write a program tow add two matrices.
44. Write a program tow multiply two matrices.
45. Write a program to print the sum of each row and each column of a given matrix.
46. How array are represented in memory? Describe the row major and column major representation of a matrix.
47. Write a program to find the length of a string.
48. Write a function to copy a string in other string.
49. Write a function to concatenate a string in another string.
50. Write a program to store and print the records of students with fields RegNo, Name, and marks.
51. Write a program to set a bit at a third bit position of a character type variable.
52. Write a program to unset a bit at a third bit position of a character type variable.
53. Write a program to find a bit at a third bit position of a character type variable.
54. Write a program to print all the bits of a character type variable.

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55. Write a program to print the contents of a file.
56. White a program to copy the contents of a file to another file.
57. Write a program to change the tenth character of the contents of a file.
58. Write a program to print the sum of all the numbers coming from the command line.

Reference Books:

- *Let us C-Yashwant Kanetkar.*
- *Programming in C -Balguruswamy*
- *The C programming Language – Dennis Ritchie*
- *Structured programming approach using C-Forouzah & Ceilberg Thomson learning Publication.*

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BCA-24-104ME1: Principles of management

Course Outcome:

CO 1: Describe primary features, processes and principles of management.

CO 2: Explain functions of management in terms of planning, decision making and organizing.

CO 3: Illustrate key factors of leadership skill in directing and controlling business resources and processes

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	**Management**: Need, Scope, Meaning and Definition. The process of Management, nature & purpose, importance & Functions, Management as Art, Science & Profession- Management as social System Concepts of management-Administration-Organization, Management Skills, Levels of Management. Development of Management thought F.W. Taylor and Henry Fayol, Horothorne Studies, Qualities of an Efficient Management.	**15**
II	**Functions of Management: Part-I** Planning: Meaning and Importance, Planning Process, Decision making – Meaning, Importance and Process. Organizing: Meaning and Importance, Process of Organization, Delegation of Authority Meaning and Importance, Centralization versus Decentralization. Staffing: Meaning and Importance of staffing. Process of Staffing.	**156**
III	**Functions of Management: Part-II** Directing: Concept, Techniques of directing and supervision. Motivation: Concept, Need for motivation. Theories of motivation. Leadership: Concept and Importance; Leadership Styles. Communication and its types. Concept of Control: Preventive and corrective control. Control Techniques. Major Techniques of control.	**15**
IV	**Directing & Controlling:** Motivation–Meaning, Importance, need. Theories of Motivation, Leadership–meaning, need and importance, leadership style, Qualities of effective leader, principles of directing, Basic control process, Different control Techniques.	**15**

Reference Books:

1. Essential of Management – Horold Koontz and Iteinz Weibrich- McGraw-Hill's International
2. Management Theory & Practice – J.N.Chandan
3. Essential of Business Administration – K.Aswathapa, Himalaya Publishing House
4. Principles & practice of management – Dr. L.M.Prasad,, Sultan Chand & Sons – New Delhi
5. Business Organization & Management – Dr. Y.K.Bhushan
6. Management: Concept and Strategies by J.S. Chandan, Vikas Publishing
7. Principles of Management, By Tripathi, Reddy Tata McGraw Hill
8. Business organization and Management by Talloo, Tata McGraw Hill

9.Business Environment and Policy – A book on Strategic Management/ Corporate Planning by Francis Cherunilam Himalaya Publishing House 2001 Edition

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BCA-24-104ME2: Emerging Information technology

Course Outcome:

CO 1: Demonstrate architecture, functioning & services of the Internet and basics of multimedia.

CO 2: Illustrate the emerging trends and technologies in the field of Information Technology.

CO 3: Understanding Innovation and Problem-Solving, Ethical and Societal Implications of emerging technologies.

CO4: Learn and aware of Internet activities.

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	**Internet:** Overview, Architecture, Functioning, Basic services like WWW, FTP, Telnet, Gopher etc., Search engines, E-mail, Web Browsers. **Internet of Things (IoT):** Definition, Sensors, their types and features, Smart Cities, Industrial Internet of Things.	15
II	**Block chain:** Introduction, overview, features, limitations and application areas fundamentals of Block Chain. **Crypto currencies:** Introduction, Applications and use cases **Cloud Computing:** It nature and benefits, AWS, Google, Microsoft & IBM Services	15
III	**Emerging Technologies:** Introduction, overview, features, limitations and application areas of Augmented Reality, Virtual Reality, Grid computing, Green computing, Big data analytics, Quantum Computing and Brain Computer Interface	15
IV	**NICNET, ERNET, E-commerce, and Multimedia Introduction:** Basic Awareness of NICNET and ERNET; E Commerce, E governance; Brief Introduction to Different Formats of Image, Audio, Video. Data Concepts and Data Processing, Data Science, Data Representation, Application of IT to E-commerce, Electronic Governance, Multimedia, Entertainment, Introduction to Information System	15

Reference Books:

1. Rajaraman V., "Fundamentals of Computers", Prentice-Hall of India.
2. Norton P., "Introduction to Computers", McGraw Hill Education.
3. Goel A., "Computer Fundamentals", Pearson.
4. Balagurusamy E., "Fundamentals of Computers", McGraw Hill
5. Thareja R., "Fundamentals of Computers", Oxford University Press.
6. Bindra J., "The Tech Whisperer- on Digital Transformation and the Technologies that Enable it", Penguin

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BCA-24-105VC: Office Automation

Course Outcome:

CO 1: Effectively use office automation tools for document creation, presentation, and data analysis.

CO 2: Demonstrate effective communication and collaboration skills using office automation tools.

CO 2: Apply advanced features of office software to optimize office tasks and workflows.

CO 3: To analyze data using excel functions and visualize data using excel charts.

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	INTRODUCTION TO OFFICE AUTOMATION: Overview of office automation and its benefits, Office Suite applications and their features. Ethical and Legal Considerations in Office Automation.	10
II	WORD PROCESSING: Word processing: Formatting, Styles, Bullets & Numbering, Pages, Tables, Illustration, Links, Header & Footer, Design Formatting, References, Mail Merge, Review & View.	10
III	SPREADSHEET: Spreadsheets: Working & Formatting Spreadsheet, Conditional Formatting, Styles, Charts. Sort & Filter, Queries & Connection, Get & Transform Data, Formulas, Functions. Data Tools, What-if-Analysis, Templates, and Document Automation, Collaboration Tools: Track Changes and Comments, Protect & Locking sheet.	15
IV	PRESENTATION TOOLS AND EMAIL MANAGEMENT: Creating and delivering presentations, Draw & Design, Transition & Animation, Recording, creating video. Email and Calendaring: Managing emails and appointments	10

Reference Books:

1. Introduction to Information Technology - Alexis Leon, Mathews Leon, and Leena Leon, Vijay Nicole Imprints Pvt. Ltd., 2013.
2. "Office 2019 All-in-One for Dummies" by Peter Weverka.
3. "Microsoft Office 365 for Dummies" by Wallace Wang
4. Teach Yourself VISUALLY Office 2019" by Paul McFedries.

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BCA-24-201: Business Communication

Course Outcome:

CO 1: To be familiar with the Meaning of business communication, barrier of communication, essential needs for good communication.

CO 2: On successful completion of this unit the students have the basic Knowledge of oral communication like Teleconferences, Press Conference, Demonstration, Radio Recording, Dictaphone, Meetings etc.

CO 2: On successful completion of this unit the students have the basic Knowledge of written communication, Principle of Effective writing, Writing Techniques, Electronic Writing Process.

CO 3: To be familiar with Information Technology tools and technique require for business communication.

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	INTRODUCTION Process and Importance of Communication, Types of Communication (verbal &Non-Verbal), Different forms of Communication. Barriers to Communication: Linguistic Barriers, Psychological Barriers, Interpersonal Barriers, Cultural Barriers, Physical Barriers, Organizational Barriers. Role, effects and advantages of technology in Business Communication like email, text messaging, instant messaging and modern techniques like video conferencing, social networking. Strategic importance of ecommunication.	**30**
II	NON-VERBAL ASPECTS OF COMMUNICATING: Body Language, Kinesics, Proxemics, Paralanguage. Effective Listening: Principles of Effective listening, Factors affecting listening exercises, Oral, Written and video sessions, Interviewing skills: Appearing in interviews, Writing resume and letter of application. Modern forms of communicating: E-Mail, Video Conferencing etc.	**20**
III	BUSINESS LANGUAGE AND PRESENTATION: Importance of Business language, Vocabulary Words often confused Words often misspelt, Common errors in English. Oral Presentation Importance, Characteristics, Presentation Plan, Power point presentation, Visual aids. WRITING SKILLS: Planning business messages, Rewriting and editing, the first draft and reconstructing the final draft. OFFICE CORRESPONDENCE: Official Letter, Semi Official Letter and Memorandum.	**20**
IV	REPORT WRITING Identify the types of reports, define the basic format of a report, identify the steps of report writing, write a report meeting the format requirements, determine the process of writing a report, importance of including visuals such as tables, diagrams and charts in writing report, apply citation rules (APA style documentation) in reports.	**20**

Reference Books:

1. Lesikar, R.V. & Flatley, M.E.; Basic Business Communication Skills for Empowering the Internet Generation, Tata McGraw Hill Publishing Company Ltd. New Delhi.
2. Bovee, and Thill, Business Communication Today, Pearson Education
3 Shirley, Taylor, Communication for Business, Pearson Education
4. Locker and Kaczmarek, Business Communication: Building Critical Skills, TMH

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BCA-24-202: Discrete Math

Course Outcome:

CO 1: Remember and understand the concepts related to Discrete mathematics
CO 2: Apply the knowledge of Discrete Mathematics to analyze various problems
CO 3: Evaluate the effectiveness of algebraic structure and create effective solutions for mathematical issues

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	**Unit-1** **Set Relations and Function:** Sets and Elements, Equality of Sets, Subsets, Set operations, Venn Diagrams & Set operations, Fundamentals products, Algebra of Sets, Duality, Finite Sets, Counting Principles, Classes of Sets, Induction, Symmetric Difference. Relations, Representation of Relations, Compositions of Relations, Types of Relations, Equivalence Relations, Partial Ordering Relation, Functions: Function, Mapping, Real valued, Composition, One to One, Onto, Invertible, and the Cardinality of a set.	20
II	**Unit-II** **Mathematical Logic:** Statements and Notation, Connectives, Negation, Conjunction, Disjunction, Statement formulas and Truth tables. Conditional and Biconditional, Tautologies, Contradictions, 'FF, Equivalence of formulae, Duality saw, Two state Devices and Statement. Logic. Normal forms, Disjunctive Normal Forms, Conjunctive Normal forms. Predicate Logic: Theory of Predicates, First order predicate, Predicate formulas, Quantifiers, Inference theory of predicate logic.	20
III	**Unit- III** Posets, Hasse Diagram and Lattices: Introduction, Partial ordered sets, Combination of Partial ordered sets, Hasse diagram, Introduction of lattices, Properties of lattices – Bounded, Complemented, Modular and Complete lattice.**Basic component of Graph:** Basic of graph, Pseudograph, Multigraph, Simple graph, Bipartite graph and Complete Biparitite graph, Hand shaking Lemma, Sub graph, Operations on graph, Walk path and Circuits and their properties, Shortest path Problem. Unicursal and eulerian graph, Randomly Eulerian graph, Fleury's Algorithm, Chinese Postman Problem, Hamiltonian graph, Necessary and sufficient conditions, Travelling Salesman problem.	30
IV	**PERMUTATIONS COMBINATIONS & GENERATING FUNCTION** Fundamental principles of counting, Permutations and combinations, Binomial theorem combinations with repetition, Combinatorial numbers, Principle of inclusion and exclusion — Derangements — Arrangements with forbidden positions. Generating functions Partitions of integers — Exponential generating function — Summation operator —Recurrence relations — First order and second order — Non-homogeneous recurrence relations — Method of generating functions.	20

Reference Books:

1. B.S. Grewal, "Elementary Engineering Mathematics", 34th Ed., 1998.
2. Shanti Narayan, "Integral Calculus", S. Chand & Company, 1999
3. H.K. Dass, "Advanced Engineering Mathematics", S. Chand & Company, 9th Revised Edition, 2001.
4. Shanti Narayan, "Differential Calculus", S.Chand & Company, 1998.

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BCA-24-203T: Data Structure using C

Course Outcome:

CO 1: List down and extend the concepts related to Data Structures

CO 2: Choose the knowledge of data structures to inspect various programme

CO 3: Evaluate the effectiveness of types of data structures and create effective solutions for data structure programme

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	Introduction to Data Structure and its characteristics. **Array** Representation of single and multidimensional arrays; Sparse arrays – lower and upper triangular matrices and Tridiagonal matrices with Vector Representation also. **Stacks and Queues** Introduction and primitive operations on stack; Stack application; Infix, postfix, prefix expressions; Evaluation of postfix expression; Conversion between prefix, infix and postfix, introduction and primitive operation on queues, D- queues and priority queues.	**15**
II	**Lists** Introduction to linked lists; Sequential and linked lists, operations such as traversal, insertion, deletion searching, two way lists and Use of headers	**15**
III	**Trees** Introduction and terminology; Traversal of binary trees; Recursive algorithms for tree operations such as traversal, insertion, deletion; Binary Search Tree	**15**
IV	**B-Trees** Introduction, The invention of B-Tree; Statement of the problem; Indexing with binary search trees; a better approach to tree indexes; B-Trees; working up from the bottom; Example for creating a B-Tree **Sorting Techniques:** Insertion sort, selection sort, merge sort, heap sort. **Searching Techniques:** linear search, binary search and hashing.	**15**

Reference Books:

1. E.Horowitz and S.Sahani, "Fundamentals of Data structures", Galgotia Book source Pvt. Ltd., 2003
2. R.S.Salaria, "Data Structures & Algorithms", Khanna Book Publishing Co. (P) Ltd..,2002
3. Y.Langsam et. Al., "Data Structures using C and C++", PHI, 1999

BCA-24-203P: Data Structure Lab

Course Outcome:

CO 1: List down and extend the concepts related to Data Structures

CO 2: Choose the knowledge of data structures to inspect various programme

CO 3: Evaluate the effectiveness of types of data structures and create effective solutions for data structure programme

Practical Exercises:

1. Write a 'C' program to maintain stack with its proper functions by array.
2. Write a program to maintain stack with its proper functions by using linked list.
3. Write a 'C' program to maintain queue with its proper functions by array.
4. Write a program to maintain queue with its proper functions by using linked list.
5. Write a program to add nodes at the beginning of the list.
6. Write a program to add nodes at the end of the list.
7. Write a program to make sorted linked list.
8. Write functions for the following linked list operation:
   a. Add node after the given node.
   b. Add node before the given node.
   c. Delete the given item
   d. Print the list.
   e. Print the list in reverse order.
   f. Delete all nodes of the list.

9. Write functions for the following two way (doubly) linked list operation:
   a. Add node at the beginning of the list.
   b. Add node at the end of the list.
   c. Add node after the given node.
   d. Add node before the given node.
   e. Delete the given item
   f. Print the list.
   g. Print the list in reverse order.
   h. Delete all nodes of the list.

10. Write a program to maintain the Binary Search Tree with following functions:
    a. Add node
    b. Delete node
    c. In order traversing
    d. Pre order traversing
    e. Post order traversing

11. Write a program to search a key in a given array using linear searching method.
12. Write a program to search a key in a given sorted array using linear searching method.
13. Write a program to search a key in a given array using binary searching method.
14. Write a program to sort an array using insertion sort method.
15. Write a program to sort an array using selection sort method.

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16. Write a program to sort an array using merge sort method.
17. Write a program to sort an array using heap sort method.

Reference Books:

1. E.Horowitz and S.Sahani, "Fundamentals of Data structures", Galgotia Book source Pvt. Ltd., 2003
2. R.S.Salaria, "Data Structures & Algorithms", Khanna Book Publishing Co. (P) Ltd..,2002
3. Y.Langsam et. Al., "Data Structures using C and C++", PHI, 1999

BCA-24-204ME1: Organizational Behaviour

Course Outcome:

CO 1: Describe primary features, processes and principles of management.

CO 2: Utilize and Discover different Personal attributes of Organizational Behavior based on Attitude, Perception and Learning

CO 3 Evaluate and different theories and create best practices to be followed in an organization

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	**Introduction:** Concept and nature of Organizational behavior, contributing disciplines to the field of Organizational Behavior, Models of Organizational Behavior, Need to understand human behavior, Challenges and Opportunities.	**10**
II	**Perception, Attitude, Values and Motivation** Concept, Nature, Process, Importance, Management Behavioural aspect of Perception. Effects of employee attitudes; Personal and Organizational Values; Job Satisfaction; Nature and Importance of Motivation; Achievement Motive; Theories of Work Motivation: Maslow's Need Hierarchy Theory, McGregor's Theory 'X' and Theory 'Y'	**15**
III	**Personality** Definition of Personality, Determinants of Personality; Theories of Personality- Trait and Type Theories, The Big Five Traits. **Interpersonal & Group Behaviour:** Interpersonal Behavior: Johari Window, Transactional Analysis: ego states, types of transactions, life positions, applications of Transaction Analysis. Concept of Group and Group Dynamics, Types of Groups: Formal and Informal Groups, Stages of Group Development, Theories of Group Formation, Group Norms, Group Cohesiveness, Group Think and Group Shift, Trait and behavioral theories of Leadership, Team: Building and managing effective teams.	**20**
IV	**Organizational Structure & Management of Change:** Organizational Structure: Meaning and Functions. Organizational Culture: Concept & Functions, Managing Conflict: Sources, types, process and resolution of conflict. Managing Change, Force Field analysis, Lewin's Model of Change.	**15**

Reference Books:

1. Organizational Behavior Text, Cases and Games- By K.Aswathappa, Himalaya Publishing House, Mumbai, Sixth Edition (2005)
2. Organizational Behavior Human Behavior at Work By J.W. Newstrom, Tata McGraw Hill Publishin Company Limited, New Delhi, 12th Edition (2007)
3. Organizational Behavior – By Fred Luthans
4. Organizational Behavior – By Super Robbins
5. Organizational Behavior – Anjali Ghanekar
6. Organizational Behavior Fundamentals, Realities and Challenges By Detra Nelson, James Campbel : Quick Thomson Publications
7. Organizational Behavior through Indian Philosophy, By N.M.Mishra, Himalaya Publication House

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BCA-24-204ME2: Object Oriented Programming Using C++

Course Outcome:

CO 1: Ability to understand the basic concept of OOPs, its features and related terminology
CO 2: Understanding the Problem-Solving and Logic.
CO 2: Understanding and Implement Object Oriented Programming Concepts in C++.
CO 3: Understanding the principles of data abstraction, inheritance and polymorphism.
CO 4: Analyzing the handling formatted I/O and unformatted and exception handling.

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	INTRODUCTION INTRODUCING OBJECT: Introducing Object – Oriented Approach, Relating to other paradigms {Functional, Data decomposition. BASIC TERMS AND IDEAS Abstraction, Encapsulation, Inheritance, Polymorphism, Review of C, Difference between C and C++ - cin, cout, new, delete, operators.	15
II	CLASSES AND OBJECTS: Encapsulation, information hiding, abstract data types, Object & classes, attributes, methods, C++ class declaration, State identity and behaviour of an object, Constructors and destructors, instantiation of objects, Default parameter value, object types, C++ garbage collection, dynamic memory allocation, Metaclass / abstract classes.	15
III	INHERITANCE AND POLYMORPHISM: Inheritance, Class hierarchy, derivation – public, private & protected, Aggregation, composition vs classification, hierarchies, Polymorphism, Categorization of polymorphism techniques, Method polymorphism, Polymorphism by parameter, Operator overloading, Parametric Polymorphism	15
IV	FILES AND EXCEPTION HANDLING: Streams and files, Namespaces, Exception handling, Generic Classes GENERIC FUNCTION Template function, function name overloading, overriding inheritance methods, Run time polymorphism, Multiple Inheritance.	15

Reference Books:

1. A.R.Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997.
2. S.B.Lippman & J.Lajoie, " C++ Primer", 3rd Edition, Addison Wesley, 2000.The C programming Lang., Pearson Ecl – Dennis Ritchie
3. R.Lafore, "Object Oriented Programming using C++", Galgotia Publications, 2004
4. D.Parasons, "Object Oriented Programming using C++", BPB Publication.

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BCA-24-205VC: Web Designing

Course Outcome:

CO 1: Understand the principles of web design and create visually appealing and user-friendly web pages.

CO 2: Understand and apply CSS and JavaScript features and syntax.

CO 2: Develop problem-solving skills to debug and fix issues in HTML, CSS, JavaScript, and Bootstrap code.

CO 3: Develop static web and Dynamic pages using HTML, CSS and JavaScript.

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	OVERVIEW OF INTERNET: Introduction to internet and www, internet protocols like TCP/IP, http, telnet and ftp, URL, email, domain name, Web Browsers, Search Engines, counters, chat &Bulletin Board services..	**10**
II	INTRODUCTION TO HTML: History and evolution of HTML, Differences between HTML Versions BASIC STRUCTURE OF AN HTML DOCUMENT: DOCTYPE declaration, HTML, Head, and Body elements, Meta tags, Essential Tags, Tags and Attributes, Text Styles and Text Arrangements, Text, Effects, Color and Background of Web Rages, Lists and their Types, Attributes of Image Tag & Hypertext, Hyperlink and Hypermedia, Links, Creating Table. HTML5 ELEMENTS AND ATTRIBUTES: HTML Semantic Elements(<header>, <footer>, <article>, <section>, <aside>, <nav>), Global Attributes(class, id, data-*, style, title), Content Models(Block-level elements vs Inline elements, Text-level semantics: , , <mark>, <time>), HTML Forms(Form Elements and Attributes <form>, <input>, <textarea>, <button>, <select>, <option>, New Input Types: email, url, date, range, color) and Form Validation.	**15**
III	INTRODUCTION TO CSS: History and evolution of CSS, Basic Syntax and Structure (CSS ruleset: selectors, properties, and values Inline, internal, external CSS, the cascade and inheritance), Selectors and Combinators, The Box Model and Layout, Responsive Design and Media Queries, Typography and Fonts, Colors, Backgrounds, and Gradients and Transitions, Transforms, and Animations.	**10**
IV	INTRODUCTION TO JAVASCRIPT: Basic Syntax and Structure, Control Structures, Functions and Scope, Objects and Arrays, The Document Object Model (DOM), Advanced JavaScript Concepts (Asynchronous JavaScript & Error Handling), JavaScript in the Browser APIs. Introduction to jQuery and Bootstrap.	**10**

Reference Books:

1. "HTML and CSS: Design and Build Websites" by Jon Duckett.
2. "Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics" by Jennifer Robbins
3 Bootstrap 4 Quick Start: Responsive Web Development with HTML5, CSS3, and JavaScript" by Jacob Lett

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