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: 2025-26)

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.

BCA (BACHELOR OF COMPUTER APPLICATION)

SEMESTER-I

Sr. No.	Subject Code	Subject Name	Paper Discipline	Sessional (CIE)	ESE	Total	Credit
1.	BCA-24-101	Fundamentals 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
	OR						
	BCA-24-104ME2	Emerging Information technology	Minor Elective	25	75	100	4
6.	BCA-24-105VC	Office Automation	Vocational	25	75	100	3

SEMESTER-II

Sr. No.	Subject Code	Subject Name	Paper Discipline	Sessional (CIE)	ESE	Total	Credit
1.	BCA-24-201	Business Communication	Major	25	75	100	6
2.	BCA-24-202	Discrete Maths	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
	OR						
	BCA-24-204ME2	Object Oriented Programming Using C++	Minor Elective	25	75	100	4
6.	BCA-24-205VC	Web Designing	Vocational	25	75	100	3

Note: The students need to opt only one elective paper in each semester either El or E2.

SEMESTER-III

Sr. No.	Subject Code	Subject Name	Paper Discipline	Sessional (CIE)	ESE	Total	Credit
1.	BCA-24-301	Computer Organization and Architecture	Major	25	75	100	6
2.	BCA-24-302	Design and Analysis of Algorithms	Major	25	75	100	6
3.	BCA-24-303T	Programming in Java	Major	25	75	100	4
4.	BCA-24-303P	Programming in Java Lab	Major	25	75	100	2
5.	BCA-24-304ME1	Elements of Statistics	Minor Elective	25	75	100	4
	OR						
	BCA-24-304ME2	Fundamentals of Economics	Minor Elective	25	75	100	4
6.	BCA-24-305VC	Basics of Data Analytics using Spreadsheet	Vocational	25	75	100	3

SEMESTER-IV

Sr. No.	Subject Code	Subject Name	Paper Discipline	Sessional (CIE)	ESE	Total	Credit
1.	BCA-24-401	Operating System	Major	25	75	100	6
2.	BCA-24-402	Data Base Management System	Major	25	75	100	6
3.	BCA-24-403T	Programming in Python	Major	25	75	100	4
4.	BCA-24-403P	Programming in Python Lab	Major	25	75	100	2
5.	BCA-24-404ME1	Operation research	Minor Elective	25	75	100	4
	OR						
	BCA-24-404ME2	Information System: Analysis Design & Implementation	Minor Elective	25	75	100	4
6.	BCA-24-405VC	Digital Marketing	Vocational	25	75	100	3

Note: The students need to opt only one elective paper in each semester either El or E2.

SEMESTER-V

Sr. No.	Subject Code	Subject Name	Paper Discipline	Sessional (CIE)	ESE	Total	Credit
1.	BCA-24-501	PHP	Major	25	75	100	4
2.	BCA-24-502	Data Communication and Networking	Major	25	75	100	6
3.	BCA-24-503	Software Engineering	Major	25	75	100	5
4.	BCA-24-504P	Internship/Project Lab	Major	25	75	100	6
5.	BCA-24-505ME1	Numerical Methods	Minor Elective	25	75	100	4
	OR						
	BCA-24-505ME2	Knowledge Management	Minor Elective	25	75	100	4
6.	BCA-24-506CC	Environment and sustainable development	Co-Curricular	-	100	100	2

SEMESTER-VI

Sr. No.	Subject Code	Subject Name	Paper Discipline	Sessional (CIE)	ESE	Total	Credit
1.	BCA-24-601	Fundamentals of Artificial Intelligence	Major	25	75	100	6
2.	BCA-24-602	Big Data and Cloud Computing	Major	25	75	100	4
3.	BCA-24-603	Network and Cyber Security	Major	25	75	100	5
4.	BCA-24-604P	Internship/Project Lab	Major	25	75	100	6
5.	BCA-24-605ME1	E-Commerce	Minor Elective	25	75	100	4
	OR						
	BCA-24-605ME2	Financial Accounting & Management	Minor Elective	25	75	100	4
6.	BCA-24-606CC	Food, Nutrition and Hygiene	Co-Curricular	-	100	100	2

Note: The students need to opt only one elective paper in each semester either El or E2.

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

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	**10**

	pointer variable, Array and pointer, Pointer to function, Command line arguments, Dynamic memory allocation. **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
    ```

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.

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.*

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.	**15**
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

BCA-24-104ME2: EMERGING INFORMATION TECHNOLOGY

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.
CO3: Understanding the concept and implications of Networking and internet

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.	**15**
II	**UNIT-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. **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**
III	**UNIT-III** **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	**15**
IV	**UNIT-IV** **Overview of Emerging Technologies:** Definition and scope of emerging technologies and Importance and impact on various industries, overview of Internet of Things (IoT), Artificial Intelligence (AI) and Machine Learning (ML) , Big Data and Analytics, Blockchain Technology, Cloud Computing, Cybersecurity, Virtual Reality (VR) and Augmented Reality (AR), Mobile and Web Technologies.	**15**

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.

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.

SEMESTER – I

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

BCA-24-202: Discrete Maths

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. Schaum's Outlines, "Discrete Mathematics", 12th Edition, 2019.
2. Dr. Swapan Kumar Sarkar, "Discrete Mathematics", S. Chand & Company, 1999
3. Jean-Paul Tremblay, "Discrete mathematical structures with applications to computer science", McGraw Hill Education.

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.

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

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.

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

SEMESTER – III

BCA-24-301: Computer Organization and Architecture

Course Outcome:

CO1: Understand the architecture and organization of a computer system, including the CPU, memory, and I/O devices.

CO2: Comprehend the basic principles of digital electronics, including logic gates, flip-flops, and combinational and sequential circuits.

CO3: Analyze and design digital circuits using Boolean algebra and logic gate representations.

CO4: Explain the functioning of various computer components, such as registers, ALU, control unit, and memory hierarchy.

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	Logic gates and circuit Gates (OR, AND, NOR, NAND, XOR & XNOR); De Morgan's laws; Boolean laws, Circuit designing techniques (SOP, POS, K-Map). Multiplexors; Decoder; Encoder; Adder and Subtractor. Combinational Building Blocks	**20**
II	Sequential Building Blocks: Flip-Flop (RS, D, JK, Master-slave & T flip-flops); Registers & Shift registers; Counters; Synchronous and Asynchronous , Designing method. Basic computer organization and design, Instructions and instruction codes, Timing and control/ instruction cycle, Register/ Types of register/ general purpose & special purpose registers/ index registers, Register transfer and micro operations/ register transfer instructions, Memory and memory function, Bus/ Data transfer instructions	**20**
III	Arithmetic logic micro-operations/ shift micro-operations, Input/ Output and interrupts, Memory reference instructions, Memory interfacing, Cache memory. Central Processing Unit: General Register Organization/ stacks organizations, instruction formats, addressing modes, Data transfer and manipulation. Program control, reduced computer, pipeline/ RISC/ CISC pipeline vector processing/ array processing.	**30**
IV	Computer Arithmetic : Floating-point representations. Addition, subtraction and multiplication algorithms, divisor algorithms. Floating point arithmetic operations, decimal arithmetic operations. Booth's algorithm. Input – Output Organization: Peripheral devices, Input/output interface, ALU Asynchronous Data transfer, mode of transfer, priority interrupts, Direct memory Address (DMA), Input/ Output processor (IOP), serial communication.	**20**

Reference Books:

1. Digital Logic and Computer design (PHI) 1998 : M.M. Mano
2. Computer Architecture (PHI) 1998 : M.M. Mano
3. Digital Electronics (TMH) 1998 : Malvino and Leach
4. Computer Organization and Architecture : William Stallings
5. Digital fundamentals (Universal Book Stall) 1998 : Floyd, L.Thomas

BCA-24-302: Design and Analysis of Algorithms

Course Outcome:

CO 1: To teach the students demonstrate performance of algorithms with respect to time and space complexity.
CO 2: Remember and understand the concepts related to algorithm
CO 3: Apply the knowledge of algorithm to analyze various source code
CO 4: Evaluate the effectiveness of algorithm and create effective solutions for source code

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	**Introduction:** Definition of Algorithm, Fundamentals of Algorithmic problem solving, Important problem types. Fundamental of data structures.	**20**
II	**Fundamentals of the Analysis of Algorithm Efficiency:** Analysis Framework, Measuring the input size, Units for measuring Running time, Orders of Growth, Worst-case, Best-case and Average-case efficiencies, Asymptotic Notations and Basic Efficiency classes, Informal Introduction, O-notation, Ω-notation, θ-notation.	**30**
III	**Sorting and Searching:** Sorting: Bubble Sort, Insertion Sort and Selection Sort; Searching: Sequential Search, Merge Sort, Quick Sort, Binary Search.	**20**
IV	**Graph & Analysis:** Introduction to Depth First Search, Breadth First Search, Minimum Spanning Tree, Travelling Salesman Problem and Knapsack Problem.	**20**

Reference Books:

- Ellis Horowitz, SartajSahni, Sanguthevar Rajasekaran (2008). *Fundamentals of Computer Algorithms.* Galgotia Publications Pvt. Ltd.
- Gilles Brassard and Paul Bratley (1997).*Fundamentals of Algorithms*, PHI.
- AnanyLevitin(2005).*Introduction to Design and Analysis of Algorithms,.*Pearson Education
- Thomas H. Corman, Charles E. Leiserson, Ronald and L. Rivest (2003). *Introduction to Algorithms* PrenticeHall of India

BCA-24-303T: Programming in Java

Course Outcome:

CO 1: Apply the concept of object-oriented programming using Java

CO 2: Apply and analyze the real-world problems using Java programming

CO 3: Build the solution of real problems using Java programming concepts and evaluate it

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	**Introduction to java:** Importance and features of java, keywords, constants, data types and variables, operators and expression. **Decision making, branching and looping:** if…else, switch…case, loops, break, continue, and return. **Introduction OOPs:** class, object, defining class, adding fields and methods in the class, static methods, creating objects, constructors, destructor.	**15**
II	**Arrays and strings:** Creating an array, one and two dimensional arrays, string and string buffer classes, wrapper classes, Vector class. **Inheritance**: Introduction and type of inheritance, using super keyword, access specifiers, final field, abstract and final methods, abstract and final classes, packages and interfaces. **Exception handling**: fundamentals exception types, uncaught exception, throw, throws, finally, built in exception, creating your own exceptions. **Multithreaded programming**: Differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, Inter-thread communication, suspending, resuming and stopping thread.	**15**
III	**Input/output:** basics, streams, byte and character stream, reading and writing from console and files, using standard java packages (lang, util, io, net). **Networking:** introduction: TCP/IP and UDP protocols, IP-Address, port number and socket, networking classes and interfaces, using java.net package, TCP/IP and datagram programming. **JDBC:** Introduction, Drivers, Establishing Connection, Connection Pooling.	**15**
IV	**Event Driven Programming:** Graphics programming: Frame, Components, working with 2D shapes, Using colors, fonts, and images. Basics of event handling: event handlers, adapter classes, actions, mouse events, AWT event hierarchy. Introduction to Swing: layout management, Swing Components: Text Fields, Text Areas, Buttons, Check Boxes, Radio Buttons, Lists, choices, Scrollbars, Windows Menus and Dialog Boxes.	**15**

Reference Books:

1. Herbert Schildt, "Java The complete reference‖", McGraw Hill Education, 8th Edition, 2011.
2. Cay S. Horstmann, Gary Cornell, "Core Java Volume –I Fundamentals", Prentice Hall, 9th Edition,2013.
3. Steven Holzner, “Java Black Book”, Dreamtech.
4. E Balagurusamy, “ Programming in Java”, McGraw Hill
5. Naughton, Schildt, “The Complete reference java2”, McGraw Hill
6. Khalid Mughal, “A Programmer’s Guide to Java SE 8 Oracle Certified Associate (OCA)”, Addison-Wesley.

BCA-24-303P: Programming in Java Lab

Course Outcome:

CO 1: Apply the concept of object-oriented programming using Java

CO 2: Apply and analyze the real-world problems using Java programming

CO 3: Build the solution of real problems using Java programming concepts and evaluate it

Practical Exercises:

1. Write a program to print hello world.
2. Write programs to print following format: -

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

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

b.
```
 1
121
12321
1234321
```

c.
```
  A
 ABA
ABCBA
ABCDCBA
```

3. Write a program to input two numbers by using scanner class and print the sum.
4. Write a program to check given number is prime or not.
5. Write a program to print all prime numbers from 1 to 500
6. Write a program to print Fibonacci series.
7. Write a program to check given number is palindrome or not.
8. Write a program to check the given number is perfect number of not.
9. Write a program to check the given number is Armstrong or not.
10. Create programs to implement the concept of class and object definition.
11. Create programs to implement the concept of constructors and destructor.
12. Create programs to implement the concept of static fields and methods.
13. Write a program to add two matrices.
14. Write a program to multiply two matrices.
15. Write a program that asks to input value in jagged array and print it.
16. Write programs to search an array using sequential and binary method.
17. Write a program to print the transpose of a matrix.
18. Write a program that asks to input a string and print it in upper case using toUpperCase method. Also try some other methods of String class.
19. Write a program to add some strings in Vector and print it. Also try some other methods of Vector class.
20. Create programs to implement the concept of different access modifiers private, friendly, protected and public.
21. Create programs to implement the concept of final field, abstract and final methods.
22. Create programs to implement the concept of abstract and final classes.
23. Create programs to implement the concept of packages and interfaces.
24. Create programs to implement the concept of exception handling.
25. Create programs to implement the concept of user defined exception.

26. Create programs to implement the concept of multithreaded programming.
27. Create programs to read and write from/to files.
28. Create programs to send message to another device using TCP/IP protocol.
29. Create programs to send message to another device using UDP protocol.
30. Create programs to implement the concept of JDBC.
31. Develop a GUI application using AWT controls with three buttons “Red”, “Green”, “Blue”. On click of each button the background color of application should change accordingly.
32. Design a menu-based GUI application using Java AWT

Suggested Readings:

1. Herbert Schildt, "Java The complete reference‖", McGraw Hill Education, 8th Edition, 2011.
2. Cay S. Horstmann, Gary Cornell, "Core Java Volume –I Fundamentals", Prentice Hall, 9th Edition,2013.
3. Steven Holzner, “Java Black Book”, Dreamtech.
4. E Balagurusamy, “ Programming in Java”, McGraw Hill
5. Naughton, Schildt, “The Complete reference java2”, McGraw Hill
6. Khalid Mughal, “A Programmer’s Guide to Java SE 8 Oracle Certified Associate (OCA)”, Addison-Wesley.

BCA-24-304ME1: Elements of Statistics

Course Outcome:

CO 1: A student will be able to use appropriate technology as one tool to Organize and describe data and distinguish between categorical (qualitative) and numerical (quantitative) data.
CO 2: On successful completion of this course, the students will be able to demonstrate the theoretical and numerical problem of permutation and combination
CO 3: A student will be able to calculate the measures of dispersion including range, standard deviation, variance, and interquartile range; explain the meaning of dispersion as it relates to a problem

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	**Population, Sample and Data Condensation** Definition and scope of statistics, concept of population and simple with Illustration, Raw data, attributes and variables, classification, frequency distribution, Cumulative frequency distribution. **Measures of Central Tendency** Concept of central Tendency, requirements of good measures of central tendency, Arithmetic mean, Median, Mode, Harmonic Mean, Geometric mean for grouped and ungrouped data.	**15**
II	**Measures of Dispersion:** Concept of dispersion, Absolute and relative measure of dispersion, range variance, Standard deviation, Coefficient of variation. **Permutations and Combinations** Permutations of 'n' dissimilar objects taken 'r' at a time (with or without repetitions). nP r= n!/(n-r) !(without proof). Combinations of 'r' objects taken from 'n' objects.nCr= n!/(r!(n-r)!) (Without proof). Simple examples, Applications.	**20**
III	**Sample space, Events and Probability** Experiments and random experiments, Ideas of deterministic and non-deterministic experiments; Definition of sample space, discrete sample space, events; Types of events, Union and intersections of two or more events, mutually exclusive events, Complementary event, Exhaustive event; Simple examples. Classical definition of probability, Addition theorem of probability without Proof (up to three events are expected). Definition of conditional probability Definition of independence of two events, simple numerical problems.	**15**
IV	**Statistical Quality Control** Introduction, control limits, specification limits, tolerance limits, process and product control; Control charts for X and R; Control charts for number of defective {n-p chart}, control charts for number of defects {c - chart}	**10**

Reference Books:

1. Gupta & Gupta: Business Statistics
2. Gupta, B.N.: Sankhyiki
3. Hooda, R.P.: Statistics for Business Economics
4. Puri, V.K.: Elements of Business Statistics
5. Business Statistics: S. M Shukla
5. Business Statistics: K. L. Gupta

BCA-24-304ME2: Fundamentals of Economics

Course Outcome:

CO 1: Remember and understand the relevance of economics for a business firm.
CO 2 Analyze the different laws of economics and apply them in various changing situations in industry
CO 3 Evaluate the different market structures leading towards creation of a business and economy as a whole

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	The Fundamentals of Economics the Economic Problem-Scarcity and Choice; Nature and Scope- Positive and Normative Economics, Micro and Macro Economics; Central Problems of an Economy; Production Possibility Curve; Opportunity Cost; Working of Economic Systems; Economic Cycles	**20**
II	Basic Elements of Demand and Supply Demand- Meaning, Demand Schedule, Individual and Market Demand Curve, Determinants of Demand, Law of Demand, Changes in Demand; Supply- Meaning, Supply Schedule, Individual and Market Supply Curve, Determinants of Supply, Law of Supply, Changes in Supply; Equilibrium of Demand and Supply Determination of Equilibrium Price and Quantity, Effect of a shift in Demand or Supply; Elasticity of Demand and Supply	**30**
III	Market Structure: Equilibrium of a firm and Price, Output Determination under Perfect Competition Monopoly, Monopolistic Competition & Oligopoly Macro-Economic Concerns: Inflation, Unemployment, Trade-Cycles, Circular Flow up to Four Sector Economy, Government in the Macro Economy: Fiscal Policy, Monetary Policy, Measuring national Income and Output	**20**
IV	The World Economy – WTO, Globalisation, MNC's, Outsourcing, Foreign Capital in India, Trips, Groups of Twenty (G-20), Issues of dumping, Export-Import Policy 2004-2009	**20**

Reference Books:

1. Ahuja H.L., "Business Economics", S.Chand & Co., New Delhi, 2001
2. Ferguson P.R., Rothschild, R and Ferguson G.J."Business Economics" Mac-Milan, Hampshire, 1993
3. Karl E.Case & Ray C. fair , "Principles of Economics" , Pearson Education , Asia, 2000
4. Nellis, Joseph, Parker David, "The Essence of Business Economics", Prentice Hall, New Delhi, 1992.

BCA-24-305VC: Basics of Data Analytics using Spreadsheet

Course Outcome:

CO1: Understand the basics of data analytics and its applications.

CO2: Develop proficiency in using spreadsheet software for data manipulation and analysis.

CO3: Build and use spreadsheet models for decision making & Communicate data insights effectively

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	UNIT I: Introduction to Data Analytics Understanding data and its types (structured, unstructured, semi-structured)-What is Data Analytics- Types of data Analytics- Importance of Data Analytics- Applications of Data Analytics.	**10**
II	UNIT II: Data, Ethics, and Industry: Case Studies Data Collection Methods - Different Data Sources & format - Data Cleaning and Transformation - Handling Missing Data and Outliers. - Ethical considerations in data analytics. - Real-world Applications of Data Analytics- Industry-specific applications (finance, marketing, operations) - Case Study	**10**
III	UNIT III: Introduction to Excel and Basic Functions 1. Getting started with Excel: Workbook, Worksheet, Cells, and Ranges 2. Data entry and basic formatting techniques 3. Using basic arithmetic functions: SUM, AVERAGE, MIN, MAX, ROUND 4. Introduction to cell referencing: relative, absolute, and mixed Data Importing and Pre-processing 1. Importing data from various sources (CSV, text files, web data) 2. Data cleaning: removing duplicates, handling missing data, and standardizing formats 3. Data transformation: text-to-columns, data validation techniques 4. Using the "Find & Replace" and "Text Functions" (LEFT, RIGHT, MID, CONCATENATE) Descriptive Statistics Using Excel 1. Calculating measures of central tendency: mean, median, mode 2. Computing measures of dispersion: range, variance, standard deviation 3. Creating and interpreting frequency distributions and histograms	**15**
IV	Advanced Spreadsheet Functions 1. Using logical functions: IF, AND, OR, IFERROR 2. Lookup and reference functions: VLOOKUP, HLOOKUP, INDEX, MATCH 3. Data aggregation techniques: SUMIFS, COUNTIFS, AVERAGEIFS 4. Text functions for data manipulation: TRIM, CLEAN, TEXT, RIGHT, LRFT, MID Data Visualization Techniques 1. Creating various chart types: bar, line, pie, scatter 2. Advanced charting techniques: combo charts, dual-axis charts 3. Data visualization best practices: choosing the right chart, formatting, and styling 4. Creating and customizing PivotTables and Pivot Charts	**10**

Reference Books

1. "Excel 2019 Bible" by Michael Alexander, Richard Kusleika, and John Walkenbach, John Wiley & Sons, 25 Sept 2018
2. "Spreadsheet Modeling and Decision Analysis: A Practical Introduction to Business Analytics" by Cliff T Ragsdale, Cegage learning asia pet. 2015
3. “Mastering Excel” by WebTech Solutions, Khanna Publishing House, 2024.

SEMESTER – IV

BCA-24-401: Operating System

Course Outcome:

CO 1: Explain main components, services, types and structure of Operating Systems.

CO 2: Apply the various algorithms and techniques to handle the various concurrency control issues.

CO 3: Compare and apply various CPU scheduling algorithms for process execution.

CO 4: Identify occurrence of deadlock and describe ways to handle it.

CO 5: Explain and apply various memory, I/O and disk management techniques

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	**Introduction**: What is an operating system, Simple Batch Systems, Multi-programmed Batch systems, Time- Sharing Systems, Personal – Computer Systems, Parallel systems, Distributed systems, Real- Time Systems. **Memory Management:** Background, Logical versus physical Address space, swapping, Contiguous allocation, Paging, Segmentation **Virtual Memory:** Demand Paging, Page Replacement, Page- replacement Algorithms, Performance of Demand Paging, Allocation of Frames, Thrashing, Other Considerations	**30**
II	**Processes:** Process Concept, Process Scheduling, Operation on Processes **CPU Scheduling:** Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple – Processor Scheduling. **Process Synchronization:** Background, The Critical – Section Problem, Synchronization Hardware, Semaphores, Classical Problems of Synchronization	**20**
III	**Deadlocks**: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock, Banker's Algorithm	**20**
IV	**Device Management:** Techniques for Device Management, Dedicated Devices, Shared Devices, Virtual Devices; Input or Output Devices, Storage Devices, Buffering, Secondary Storage Structure: Disk Structure, Disk Scheduling, Disk Management, Swap- Space Management, Disk Reliability **Information Management:** Introduction, A Simple File system, General Model of a File System, Symbolic File System, Basic File System, Access Control Verification, Logical File System, Physical File system File – System Interface; File Concept, Access Methods, Directory Structure, Protection, Consistency Semantics File – System Implementation: File – System Structure, Allocation Methods, Free- Space Management	**20**

Reference Books:

1. Silberschatz and Galvin, "Operating System Concepts", Person, 5 Ed. 2001
2. Madnick E., Donovan J., "Operating Systems:, Tata McGraw Hill,2001
3. Tanenbaum, "Operating Systems", PHI, 4th Edition, 2000
4. Dietel, "Operating Systems", TMH.

BCA-24-402: Database Management System

Course Outcome:

CO 1: Define and explain the basic concepts of database technologies

CO 2: Apply and analyze database schema for a given problem-domain

CO 3: Assess the querying of a database using SQL DML/DDL commands and construct integrity constraints

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	**Introduction:** Characteristics of database approach, data models, DBMS architecture and data independence. E-R Modelling: Entity types, Entity set, attribute and key, relationships, relation types, roles and structural constraints, weak entities, enhanced E-R and object modelling, Sub classes; Super classes, inheritance, specialization and generalization.	**30**
II	**Relational Data Model**: Relational model concepts, relational constraints, relational algebra **Introduction to SQL**: Characteristics of SQL, Advantage of SQL. SQL: SQL queries, SQL Data Type and Literals. Types of SQL Commands. SQL Operators and their Procedure. Tables, Views. Queries and Sub Queries. Aggregate Functions. programming using SQL.	**20**
III	**Data Normalization:** Functional Dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependence, Normal form up to 3 normal forms. **Transaction Processing Concept**: Transaction System, Testing of Serializability, Serializability of Schedules, Conflict & View Serializable Schedule, Recoverability, Recovery from Transaction Failures, Log Based Recovery, Checkpoints, Deadlock Handling. Distributed Database: Distributed Data Storage, Concurrency Control, Directory System.	**20**
IV	**Concurrency Control Techniques**: Transaction processing, locking techniques and associated, database recovery, security and authorization. Recovery Techniques, Database Security.	**20**

Reference Books:

1. C.J. Date (2004). An Introduction to Database Systems, Pearson.
2. Abraham Silberschatz and S Sudarshan (2010). Database System Concepts. McGraw Hill Education
3. Aditya Kumar Gupta (2007).Taxonomy of Database Management System.Laxmi Publications.
4. Korth, Silbertz, Sudarshan," Database Concepts", McGraw Hill
5. Elmasri, Navathe, " Fudamentals of Database Systems", Addision Wesley
6. O'Neil, Databases, Elsevier Pub.

BCA-24-403T: Programming in Python

Course Outcome:

CO 1: Recall & Summarise the basic concepts of Python Programming language

CO 2: Use the python programming syntax for Examining the real-time problems

CO 3: Appraise the various Complex programming paradigm using python & also propose the real-time application using it

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	Introduction to Python Programming: Introduction to Python: Python variables, Python basic Operators, Understanding python blocks. Python Data Types, Declaring and using Numeric data types: int, float etc.	**15**
II	Python Program Flow Control Statements: Python Program Flow Control Conditional blocks: if, else and else if, Simple for loops in python, for loop using ranges, string, list and dictionaries. Use of while loops in python, Loop manipulation using pass, continue, break and else. Programming using Python conditional and loop blocks.	**15**
III	Python Complex Data Types: Python Complex data types: Using string data type and string operations, Defining list and list slicing, Use of Tuple data type. String, List and Dictionary, Manipulations Building blocks of python programs, string manipulation methods, List manipulation. Dictionary manipulation, Programming using string, list and dictionary in-built functions. Python Functions, Organizing python codes using functions.	**15**
IV	Python File Operations: Reading files, Writing files in python, Understanding read functions, read(), readline(), readlines(). Understanding write functions, write() and writelines() Manipulating file pointer using seek Programming, using file operations.	**15**

Reference Books:

- Vamsi Kurama(2018). Python Programming: A Modern Approach. Pearson
- Mark Lutz and David Ascher (1999). Learning Python.O'Reilly & Associates, Inc.
- Allen Downey (2015). Think Python:How to Think Like a Computer Scientist. Green Tea PressNeedham, Massachusetts.
- Wesley J. Chun (2006). Core Python Programming, Prentice Hall.
- Kenneth A. Lambert (2011). Fundamentals of Python: First Programs (Introduction to Programming. Course Technology Inc

BCA-24-403P: Programming in Python Lab

Course Outcome:

CO 1: Recall & Summarise the basic concepts of Python Programming language

CO 2: Use the python programming syntax for Examining the real-time problems

CO 3: Appraise the various Complex programming paradigm using python & also propose the real-time application using it

Practical Exercises:

1. To write a python program that takes in command line arguments as input and print the number of arguments.
2. To write a python program to perform Matrix Multiplication.
3. To write a python program to compute the GCD of two numbers.
4. To write a python program to find the most frequent words in a text file.
5. To write a python program find the square root of a number (Newton's method).
6. To write a python program exponentiation (power of a number).
7. To write a python program find the maximum of a list of numbers.
8. To write a python program factorial of any given no.
9. To write a python program linear search.
10. To write a python program selection sort.

Reference Books:

- Vamsi Kurama(2018). Python Programming: A Modern Approach. Pearson
- Mark Lutz and David Ascher (1999). Learning Python.O'Reilly & Associates, Inc.
- Allen Downey (2015). Think Python:How to Think Like a Computer Scientist. Green Tea PressNeedham, Massachusetts.
- Wesley J. Chun (2006). Core Python Programming, Prentice Hall.
- Kenneth A. Lambert (2011). Fundamentals of Python: First Programs (Introduction to Programming. Course Technology Inc

BCA-24-404ME1: Operation Research

Course Outcome:

CO 1: Conceptualize the role of Optimization techniques and relate different techniques of optimization
CO 2: Choose different optimization techniques in solving various problems and inspect the optimal solution
CO 3: Determine the real-world problems and formulate optimal solution using different Optimization techniques

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	**Linear programming** Central Problem of linear Programming, various definitions including Statements of basic theorem and also their properties, simplex methods, Artificial Variable method, primal and dual simplex method, transportation problem Assignment problem and its solution. Graphical Method Formulation, Linear Programming Problem.	**20**
II	**Replacement Theory** Replacement of item that deteriorates replacement of items that fail. Group replacement and individual replacement. **Queuing Theory** Characteristics of queuing system, Classification of Queuing Model Single Channel Queuing Theory, Generalization of steady state M/M/1 queuing models (Model-I, Model-II).	**15**
III	**Game theory** Introduction, overview, uses of game theory, some applications and examples, and formal definitions of: the normal form, payoffs, strategies, pure strategy Nash equilibrium. Introduction, characteristic of game theory, Two- person zero-sum game, Pure and Mixed strategies, Saddle point and its existence.	**15**
IV	**Job Sequencing** Basic assumptions, Johnson's algorithm, sequencing 'n' jobs on single machine using priority rules, sequencing using Johnson's rule-'n' jobs on 2 machines, 'n' jobs on 3 machines, 'n' jobs on 'm' machines.	**10**

Reference Books:

- Gillet B.E. "Introduction to Operation Research"
- Taha,H.A. "Operation Research - An Introduction"
- Kanti Swaroop "Operation Research"
- S.D.Sharma "Operation Research"
- Hira & Gupta "Operation Research"

BCA-24-404ME2: Information System: Analysis Design & Implementation

Course Outcome:

CO 1: An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.

CO 2: Exhibit the ability to apply the knowledge of Object-Oriented Concepts to system analysis and design

CO 2: Demonstrate the concept of modeling as a design technique for solving real time problems.

CO 3: Discuss the Management issues related to Time, Finance, Manpower, and with Management itself in Software development. Technical knowledge of a manager for managerial skills plays a better role to cure the problems in software development life cycle.

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	OVERVIEW OF SYSTEM ANALYSIS AND DESIGN: Systems Development Life Cycle; concept and Models: requirements determination, logical design, physical design, test planning, implementation, planning and performance evaluation, communication, interviewing, presentation skills; group dynamics; risk and feasibility analysis; group-based approaches, JAD, structures walkthroughs, and design and code reviews; prototyping; database design software quality metrics; application categories software package evaluation and acquisition.	**15**
II	INFORMATION REQUIREMENT ANALYSIS: Process modelling with physical logical data flow diagrams, data modelling with logical entity relationship diagrams Developing a Proposal: Feasibility study and cost estimation.	**15**
III	APPLICATION DEVELOPMENT METHODOLOGIES AND CASE TOOLS: Information engineering, structured system analysis and design, and object-oriented methodologies for application development data modelling, process modelling, user interface design, and prototyping, use of computer aided software engineering (CASE) tools in the analysis design and implementation of information systems. Design and Implementation on OO Platform: Object oriented analysis and design through object modelling technique, object modelling, dynamic modelling and functional object-oriented design and object-oriented programming systems for implementation, object-oriented data bases.	**20**
IV	MANAGERIAL ISSUES IN SOFTWARE PROJECTS: Introduction to software markets; planning of software projects, size and cost estimates; project scheduling; measurement of software quality and productivity, ISO and capability maturity models for organizational growth.	**10**

Reference Books:

1. I.T.Haryszkiewycz, Introduction of System Analysis and Design, Pearson Education, (PHI) 1998.
2. V.Rajaraman, Analysis and Design of Information System, Pearson Education, 1991.
3. J.A.Senn, “Analysis and Design of Information Systems”
1. J.K.Whiten., L.D.Bentley, V.M.Beslow, “System Analysis and Design Methods”, (Galgotia Publications Pvt.Ltd.) 1994

BCA-24-405VC: Digital Marketing

Course Outcome:

CO 1: Understand the fundamental concepts and principles of digital marketing.

CO 2: Develop practical skills to implement various digital marketing strategies and techniques.

CO 2: Analyze and evaluate the effectiveness of digital marketing campaigns.

CO 3: Apply critical thinking and problem-solving skills to real-world digital marketing scenarios.

CO 4: Create comprehensive digital marketing plans and strategies.

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	INTRODUCTION TO DIGITAL MARKETING: Overview of digital marketing, Evolution of digital marketing, Importance and benefits of digital marketing, Digital marketing channels and platforms. DIGITAL MARKETING STRATEGY AND PLANNING: Developing a digital marketing strategy, Setting goals and objectives, Budgeting and resource allocation. Campaign planning and execution, Monitoring and adjusting digital marketing campaigns	**10**
II	SOCIAL MEDIA MARKETING: Overview of social media marketing, social media platforms and their features, Creating and optimizing social media profiles, social media content strategy, social media advertising and analytics. EMAIL MARKETING: Introduction to email marketing, building an email list, Creating effective email campaigns, Email automation and segmentation, Email marketing metrics and analytics.	**10**
III	CONTENT MARKETING: Understanding content marketing, Content strategy and planning, Content creation and distribution, Content promotion and amplification, Content marketing metrics and analytics. MOBILE MARKETING: Mobile marketing overview, Mobile advertising strategies, Mobile app marketing, Location-based marketing, Mobile marketing analytics.	**15**
IV	ANALYTICS AND REPORTING: Importance of analytics in digital marketing, setting up web analytics tools (e.g., Google Analytics), Tracking and measuring key performance indicators (KPIs), Conversion tracking and optimization, Reporting and data visualization	**10**

Reference Books:

1. "Digital Marketing Strategy: An Integrated Approach to Online Marketing" by Simon Kingsnorth.
2. "Email Marketing Rules: How to Wear a White Hat, Shoot Straight, and Win Hearts" by Chad S. White.
3. "ContentInc.: How Entrepreneurs Use Content to Build Massive Audiences and Create Radically Successful Businesses" by Joe Pulizzi.
4. "Mobile Marketing: How Mobile Technology is Revolutionizing Marketing, Communications and Advertising" by Daniel Rowles.
5. "Web Analytics 2.0: The Art of Online Accountability and Science of Customer Centricity" by Avinash Kaushik

SEMESTER – V

BCA-24-501: PHP

Course Outcome:

CO 1: Understand the basics of Web Programming concepts using PHP.

CO 2: Design dynamic and interactive web pages and websites.

CO 2: Handle databases like MySQL using PHP in websites.

CO 3: Analyze to Use appropriate client-side and Server-side application technologies.

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	INTRODUCTION TO PHP: Introduction to PHP, History and Features of PHP, Installation & Configuration of PHP, Embedding PHP code in Your Web Pages, Understanding PHP, HTML and White Space, Writing Comments in PHP, Sending Data to the Web Browser, Data types in PHP, Keywords in PHP, Using Variables, Constants in PHP, Expressions in PHP, Operators in PHP.	**15**
II	PROGRAMMING WITH PHP: Conditional statements: if, if-else, switch, The? Operator, Looping statements: while Loop, do-while Loop, for Loop ARRAYS IN PHP: Introduction- What is Array? Creating Arrays, Accessing Array elements, Types of Arrays: Indexed v/s Associative arrays, Multidimensional arrays, Creating Array, Accessing Array, Manipulating Arrays, Displaying array, Using Array Functions, Including and Requiring Files- use of Include () and Require (), Implicit and Explicit Casting in PHP..	**15**
III	USING FUNCTIONS, Class- Objects, Forms in PHP: Functions in PHP, Function definition, Creating and invoking user-defined functions, Formal parameters versus actual parameters, Function and variable scope, Recursion, Library functions, Date and Time Functions Strings in PHP: What is String? Creating and Declaring String, String Functions CLASS & OBJECTS IN PHP: What is Class & Object, Creating and accessing a Class &Object, Object properties, object methods, Overloading, inheritance, Constructor and Destructor.	**15**
IV	FORM HANDLING: Creating HTML Form, Handling HTML Form data in PHP Database Handling Using PHP with MySQL: Introduction to MySQL: Database terms, Data Types ACCESSING MYSQL –Using MySQL Client and Using php MyAdmin, MySQL Commands, Using PHP with MySQL: PHP MySQL Functions, connecting to MySQL and Selecting the Database, Executing Simple Queries, Retrieving Query Results, Counting Returned Records, Updating Records with PHP	**15**

Reference Books:

1 PHP & MySQL for Dynamic Web Sites-Fourth Edition By Larry Ullman.
2 Learning PHP, MySQL and JavaScript By Robin Nixon–O‟REILLY Publications
3 Programming PHP By RasmusLerdorf, Kevin Tatroe, Peter MacIntyre
4 SAMS Teach Yourself PHP in 24 hours, Author: Matt Zandstra, SamsPublishing

BCA-24-502: Data Communication and Networking

Course Outcome:

CO1. Understand the fundamentals of data communication and networking concepts.
CO 2. Analyze and design network architectures and topologies.
CO 3. Configure and troubleshoot network devices and protocols.
CO 4. Apply network security measures to protect data transmission.
CO 5. Understand emerging trends and technologies in data communication and networks.

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	Data Communications: Introduction: Data communication Components and characteristics, Data representation and Data flow. Networks: LAN, WAN, MAN, Topologies. Protocols and Standards: ISO-OSI model and TCP-IP Model. Network Connecting Devices: HUB, Bridge, Switch, Router and Gateways. Transmission Media: Guided and unguided Media Classification and Arrangement: Wired LANs and Wireless LANs	**20**
II	Data Link Layer: Error Detection and Error Correction: Types of errors, LRC, VRC, Checksum, CRC, and Hamming Code. Flow Control and Error Control: Stop and Wait Protocol, Sliding Window, Go-back-N-ARQ Protocol and Selective-Repeat ARQ Protocol. Channel Allocation Protocols: Random Access, Controlled and Channelization techniques such as ALOHA, CSMA, CSMA/CD, CDMA/CA, TDMA, FDMA, Token Passing, etc.	**20**
III	Network Layer: Switching Techniques: Circuit Switching, Packet Switching, and Message Switching. Logical addressing: IPv4 and IPv6 Address schemes, Classes and subnetting Network Layer Protocols: ARP, RARP, BOOTP and DHCP Routing Techniques: Interdomain and Intradomain routing with examples.	**20**
IV	Transport Layer: Introduction to Transport Layer: Process-to-Process Delivery: Reliable and unreliable Connection, Port and Socket Addressing Transport Layer Protocols with packet formats: User Datagram Protocol (UDP), Transmission Control Protocol (TCP), Stream Control Transmission Protocol (SCTP). Congestion Control: Techniques for handling the Congestion Control. Application Layer: Basic Concept of Application Layer: Domain Name System, World Wide Web, Hyper Text Transfer Protocol, Electronic mail, File Transfer Protocol, Remote login.	**30**

Reference Books:

- A.S.Tanenbaum, “Computer Networks”; Pearson Education Asia, 4th Ed. 2003.
- Behrouz A.Forouzan, “Data Communication and Networking”, 3rd Ed. Tata McGraw Hill, 2004.
- William Stallings, “Data and computer communications”, Pearson education Asia, 7th Ed., 2002.

BCA-24-503: Software Engineering

Course Outcome:

CO 1: Remember and understand the concepts related to Software engineering

CO 2: Apply the knowledge of SDLC and Analyze a problem for Requirement Engineering Process.

CO 3: Evaluate the correctness and readability of software and Create Software design with specification documentation

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	Introduction: Introduction to Software Engineering, Software Components, Software Characteristics, Software Crisis, a generic view of software engineering. Software Engineering Processes, Similarity and Differences from Conventional Engineering Processes, Software Quality Attributes. Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models. Software Requirement Specifications (SRS): Requirement Engineering Process: Elicitation, Analysis, Documentation, Data Flow Diagrams, Entity Relationship Diagrams, SRS Document, IEEE Standards for SRS. Software Quality Assurance (SQA): Verification and Validation.	**20**
II	Software Design: Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization, Design Structure Charts, Flow Charts, Coupling and Cohesion Measures, Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design.	**20**
III	Software Implementation: Relationship between design and implementation, Implementation issues and programming support environment, Coding the procedural design, Good coding style and review of correctness and readability. Software Testing: Testing Objectives, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing, Testing for Functionality and Testing for Performance, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Alpha and Beta Testing of Products.	**20**
IV	Software Maintenance: Maintenance as part of software evaluation, reasons for maintenance, types of maintenance (Perceptive, adaptive, corrective), designing for maintainability, techniques for maintenance. Software Configuration Management Activities.	**15**

Reference Books:

1. R S Pressman, “Software Engineering: A Practitioners Approach”, McGraw Hill.
2. Pankaj Jalote, “Software Engineering”, Wiley
3. Rajib Mall, “Fundamentals of Software Engineering”, PHI Publication.
4. K K Aggarwal and Yogesh Singh, “Software Engineering”, New Age International Publishers.
5. Ghezzi, M. Jarayeri, D. Manodrioli, “Fundamentals of Software Engineering”, PHI Publication.
6. Ian Sommerville, “Software Engineering”, Addison Wesley.
7. Kassem Saleh, “Software Engineering”, Cengage Learning
8. Pfleeger, “Software Engineering”, Macmillan Publication

BCA-24-504P: Project Lab

Minor Project Lab based on the summer internship

BCA-24-505ME1: Numerical Methods

Course Outcome:

CO1. Understand the principles and importance of numerical techniques.
CO2. Apply numerical methods for solving mathematical problems.
CO3. Implement algorithms for numerical differentiation and integration.
CO4. Use interpolation techniques for data analysis and approximation.
CO5. Solve ordinary differential equations numerically.

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	Roots of Equations: Bisection Method, False Position Method, Newton's Raphson Method, Rate of convergence of Newton's method.	**15**
II	Interpolation and Extrapolation : Finite Differences, The operator E, Newton's Forward and Backward Differences, Newton's dividend differences formulae, Lagrange's Interpolation formula for unequal Intervals, Gauss's Interpolation formula, Sterling formula, Bessel's formula, Laplace- Everett formula.	**15**
III	Numerical Differentiation Numerical Integration : Introduction, direct methods, maxima and minima of a tabulated function, General Quadratic formula, Trapezoidal rule, Simpson's One third rule, Simpson's 3/8 th rule	**15**
IV	Solution of Linear Equation: Gauss's Elimination method and Gauss's Siedel,s iterative method. Solution of Differential Equations: Euler's method, Picard's method, Fourth-order Runge – Kutta method.	**15**

Reference Books:

- Scarbourogh, "Numerical Analysis".
- Gupta & Bose S.C. "Introduction to Numerical Analysis, "Academic Press, Kolkata, 3. S.S.Shashtri, "Numerical Analysis", PHI
- "Numerical Methods: Principles, Analysis, and Algorithms" by Roland W. Freund and Gene H. Golub.
- "Numerical Recipes: The Art of Scientific Computing" by William H. Press, Saul A. Teukolsky, William T. Vetterling, and Brian P. Flannery.

BCA-24-505ME2: Knowledge Management

Course Outcome:

CO 1: Articulate and exemplify basics of knowledge management (Understand)
CO 2: Distinguish different types of knowledge (Understand)
CO 3: Articulate basic knowledge about knowledge capturing, codification, transferring and sharing

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	Business Intelligence and Business Decisions: Modelling Decision Process; Decision support systems; Group decision support and Groupware Technologies.	**15**
II	Executive Information and support Systems: Business Expert System and AI, OLTO & OLAP; Data Warehousing; Data Marts, Data Warehouse architecture; Tools for data warehousing.	**15**
III	Multi- Dimensional analysis: Data mining and knowledge discovery; Data mining and Techniques; Data mining of Advance Databases.	**15**
IV	Knowledge Management Systems: Concept and Structure KM systems, techniques of knowledge management appreciation & limitation.	**15**

Reference Books:

1. Decision support system, EIS, 2000
2. W.H.Inmon, “Building Data Warehousing”, Willey, 1998.
3. Han, Jiawei, Kamber, Michelinal, “Data Mining Concepts & Techniques”, Harcourt India, 2001

BCA-24-506CC: Environmental and sustainable Development

CO 1: Acquire an awareness of the total environment and its linkages to economic and social issues, and allied problems.
CO 2: Better understand challenges facing the environment and means to achieve sustainable development, and the transition to green growth.
CO 3: Acquire knowledge, skills, social values, and strong concern for the environment and motivations for active participation in its improvement and protection.

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	Conservation of Environment Defining biodiversity. Types of biodiversity conservation, In- situ conservation, Ex- situ conservation, Types of Forests, Deforestation, Endangered Species. Threats to biodiversity, Strategies for conservation of biodiversity.	**8**
II	Environmental Issues Climate Change, Carbon trading, Global Warming, Ozone layer Depletion, Air Pollution, Water Pollution, Plastic Pollution, Solid Waste Management, Melting Ice Caps, Rising of Sea, Agriculture and Urbanization	**8**
III	Sustainability and Development Meaning of Development, Defining Sustainability History of sustainable development, Approaches to Sustainable development Appraisal of the Environment, Estimation of the Environmental Impact, Natural Resource Accounting, Government Policies and Economic Outlook, Relationships among the environment, economy and society, SDGS	**8**
IV	Yoga and Environment Sustainability Understanding Yoga sutras. Ecological consciousness, Traditional knowledge on Environment, understanding various asanas and their connect with environment, Eco Karma, Sustainable food model, Importance of Prana, Planting of tress	**6**

Reference Books:

1. Rangrajan Mahesh Environmental Issues in India, Pearson
2. Sen Raj Kurnar and Kartik. C. Roy, Sustainable Economic Development and Environment: India and Other Low-Income Economies, Atlantic Publishers
3. Sandev Seema and Manish Kumar. Environment and Sustainable Development A Geographical Appraisal. Concept Publishing Company
4. lyengar B.K.S, Light on the Yoga Sutras of Patanjali, Element edition
5. Casper J.K. (2010) Changing Ecosystems: Effects of Global Warming. Infobase Pub. New York.
6. UNEP (2007) Global Environment Outlook: GEO4: Environment for Development. United Nations Environment Programme. University Press. Cambridge.

SEMESTER – VI

BCA-24-601: Fundamentals of Artificial Intelligence

Course Outcome:

CO 1: Understand fundamentals of Artificial Intelligence and Machine Learning

CO 2: Use various algorithms of Artificial Intelligence for simplification of problems

CO 3: Evaluate functioning of different algorithms of Artificial Intelligence

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	Introduction: Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence, Intelligent Agents, Structure of Intelligent Agents. Computer vision, Natural Language Possessing.	**30**
II	Introduction to Search: Searching for solutions, Uniformed search strategies, Informed search strategies, Local search algorithms and optimistic problems, Adversarial Search, Search for games, Alpha - Beta pruning.	**20**
III	Knowledge Representation & Reasoning: Propositional logic, Theory of first order logic, Inference in First order logic, Forward & Backward chaining, Resolution, Probabilistic reasoning, Utility theory, Hidden Markov Models (HMM), Bayesian Networks.	**20**
IV	Machine Learning & Expert System: Supervised and unsupervised learning, Decision trees, ID3 algorithm, Statistical learning models, learning with complete data - Naive Bayes models, Learning with hidden data - EM algorithm, Reinforcement learning. Existing Expert Systems, Introduction to Deep Learning.	**20**

Reference Books:

- Stuart Russell, Peter Norvig (2018), "Artificial Intelligence – A Modern Approach", Pearson Education
- Elaine Rich and Kevin Knight (2009), "Artificial Intelligence", McGraw-Hill
- E Charniak and D McDermott (2011), "Introduction to Artificial Intelligence", Pearson Education
- Dan W. Patterson (2015), "Artificial Intelligence and Expert Systems", Prentice Hall of India
- Winston (2008), "LISP", Addision Wesley.
- Marcellous (2011), "Expert System Programming", PHI.
- Elamie (2012), "Artificial Intelligence", Academic Press

BCA-24-602: Big Data Analytics and Cloud Computing

Course Outcome:

CO 1: Understanding Big Data Concepts & Technologies.

CO 2: Understanding Data Collection, Storage, Data Processing and Analysis.

CO 2: Understanding the concept of MongoDB and Mapreduce Programming.

CO 3: Understanding the concept of Data Analytics with R.

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	INTRODUCTION TO BIG DATA AND ANALYTICS Classification of Digital Data, Structured and Unstructured Data – Introduction to Big Data: Characteristics – Evolution – Definition - Challenges with Big Data - Other Characteristics of Data - Why Big Data - Traditional Business Intelligence versus Big Data - Data Warehouse and Hadoop Environment Big Data Analytics: Classification of Analytics – Challenges - Big Data Analytics important - Data Science - Data Scientist - Terminologies used in Big Data Environments - Basically Available Soft State Eventual Consistency - Top Analytics Tools	**15**
II	INTRODUCTION TO TECHNOLOGY LANDSCAPE NoSQL, Comparison of SQL and NoSQL, Hadoop -RDBMS Versus Hadoop - Distributed Computing Challenges – Hadoop Overview - Hadoop Distributed File System - Processing Data with Hadoop - Managing Resources and Applications with Hadoop YARN - Interacting with Hadoop Ecosystem	**15**
III	INTRODUCTION TO MONGODB AND MAPREDUCE PROGRAMMING MongoDB: Why Mongo DB - Terms used in RDBMS and Mongo DB - Data Types - MongoDB Query Language MapReduce: Mapper – Reducer – Combiner – Partitioner – Searching – Sorting – Compression	**15**
IV	INTRODUCTION TO DATA ANALYTICS WITH R Machine Learning: Introduction, Supervised Learning, Unsupervised Learning, Machine Learning Algorithms: Regression Model, Clustering, Collaborative Filtering, Associate Rule Making, Decision Tree, Big Data Analytics with R	**15**

Reference Books:

1. Hadoop For Dummies, Dirk deRoos, For Dummies, 2014
2. Big Data Analytics, Introduction to Hadoop, Spark, and Machine-Learning by Raj Kamal Preeti Saxena.
3. Big Data Analytics: A Hands-On Approach Paperback – 7 Sep 2018, by Arshdeep Bahga, Vijay Madisetti.
4. "R Cookbook" by Paul Teetor
5. "R for Data Analysis in Easy Steps" by Mike McGrath
6. "MongoDB: The Definitive Guide: Powerful and Scalable Data Storage" by Shannon Bradshaw, Eoin Brazil, and Kristina Chodorow
7. "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence" by Pramod J. Sadalage and Martin Fowler

BCA-24-603: Network and Cyber Security

Course Outcome:

CO 1: Remember and understand the concepts of cyber security

CO 2: Apply various techniques of cyber security to protect information system from cyber-attacks and analyze the intricacies involved in maintaining cyber security

CO 3: Evaluate the importance of cyber security and create secure information system.

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	**Information Systems:** Introduction to Information System, Types of Information System, Development of Secure Information System, Introduction of Information Security, Need for Information Security, Threats of Information System, Active and Passive Attacks Network and Denial of Services Attacks, Information Assurance, Cyber Security and Security Analysis.	**20**
II	**Application Security:** Application Security: Data Base Security, Email Security and Internet Security. Data Storage and Download Services, Backup Security Measures. Data Security Consideration: Backup, Archival, Storage & Disposal of Data, Security Technology: Firewall and VPN, Instruction Deduction System, Instruction Prevention System, Access Control. Security Threats: Virus, Worms, Trojan Horse, Logic Bombs, Trapdoors	**20**
III	**Security Technologies:** Cryptography, Model of Cryptographic Systems, Data Encryption Standard, RSA Algorithm, Digital Signature, Requirement of Digital Signature System. E-Governance and EDI, Concepts in Electronics payment systems, E Cash, Credit/Debit Cards, SET Protocol.	**15**
IV	Developing Secure Information System, Application Development Security, Information Security Governance & Risk Management, Security Architecture and Design, Security Metrics, Information Security Vs. Privacy, Interoperability Issues, Economic & Social Aspects. Physical Security of IT assets, Access control: CCTV, Fence, Guard, Alarms, Intrusion Detection System	**20**

Reference Books:

1. Nina Godbole (2008). “Information Systems Security: Security Management, Metrics, Frameworks and Best Practices”, John Wiley & Sons.
2. Dr. S P Tripathi, R Goyal, P K Shukla (2014). “Introduction to Information Security and Cyber Law”, Dreamtech Press.
3. Harish Chander (2012). “Cyber Laws and IT Protection”,. PHI Learning Pvt. Ltd.
4. V.K. Pachghare (2015). “Cryptography and Information Security”, PHI Learning Pvt. Ltd.

BCA-24-604P: Internship/ Project Lab

Major Project based on the summer internship

BCA-24-605ME1: E-Commerce

Course Outcome:

CO 1: Remember and understand the concepts to E-Commerce and related technologies.
CO 2: Apply the knowledge of E-Commerce technologies for online business and analyze the concept involved in online business.
CO 3: Evaluate the effectiveness of E-commerce practices in business and create a digital environment for business world.

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	**Introduction to E-Commerce**: The Scope of Electronic Commerce, Definition of Electronic Commerce, Electronic E-commerce and the Trade Cycle, Electronic Markets, Electronic Data Interchange, Internet Commerce, E-Commerce in Perspective. **Business Strategy in an Electronic Age**: Supply Chains, Porter's Value Chain Model, Inter Organizational Value Chains, Competitive Strategy, Porter's Model, First Mover Advantage .	**15**
II	Business-to-Business Electronic Commerce: Characteristics of B2B EC, Models of B2B EC, The Role of Software Agents for B2B EC, Electronic marketing in B2B, Solutions of B2B EC, Managerial Issues, Electronic Data Interchange (EDI), EDI: The Nuts and Bolts, EDI & Business.	**15**
III	**Internet and Extranet**: Automotive Network Exchange, The Largest Extranet, Architecture of the Internet, Intranet and Extranet, Intranet software, Applications of Intranets, Intranet Application Case Studies,Applications of Extranets, Business Models of Extranet Applications, Managerial Issues. **Electronic Payment Systems**: Is SET a failure, Electronic Payments & Protocols, Security Schemes in Electronic payment systems, Electronic Credit card system on the Internet, Electronic Fund transfer and Debit cards on the Internet, Stored – value Cards and E- Cash, Electronic Check Systems, Prospect of Electronic Payment Systems, Managerial Issues.	**15**
IV	**Public Policy: From Legal Issues to Privacy**: EC- Related Legal Incidents, Legal Incidents, Ethical & Other Public Policy Issues, Protecting Privacy, Protecting Intellectual Property, Free speech, Internet Indecency & Censorship, Taxation & Encryption Policies, Other Legal Issues: Contracts, Gambling & More, Consumer & Seller Protection in EC. **Infrastructure For EC:** It takes more than Technology, A Network Of Networks, Internet Protocols, Web- Based client/ Server, Internet Security, selling on the web, Chatting on the Web, Multimedia delivery, Analyzing Web Visits, Managerial Issues.	**15**

Reference Books:

1. David Whitely, " E-Commerce", Tata McGraw Hill, 2000
2. Eframi Turban, Jae Lee, David King, K. Michael Chung, "Electronic Commerce", Pearson Education, 2000

BCA-24-605ME2: Financial Accounting & Management

Course Outcome:

CO 1: Get well-versed with the accounting concepts, standards and products of financial market
CO 2: Apply the knowledge of accounting and financial products in analyzing the financial decisions of an enterprise.
CO 3: Evaluate the financial market situations to create the appropriate investment strategies for the organization.

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	**Overview** - Meaning and Nature of Financial Accounting, Scope of Financial Accounting, Financial Accounting & Management Accounting, Accounting concepts & convention, accounting standards in India. **Basics of accounting** – Capital & Revenue items, Application of Computer in Accounting, Double Entry System, Introduction to Journal, Ledger and Procedure for Recording and Posting, Introduction to Trial Balance, Preparation of Final Account, Profit & Loss Account and related concepts, Balance Sheet and related concept.	**15**
II	**Financial statement analysis:** Ratio analysis, Funds flow analysis, concepts, uses, Preparation of funds flow statement - simple problems, Cash flow analysis, Concepts, uses, preparation of cash flow statement- simple problems, Break – even analysis.	**15**
III	Definition nature and Objective of Financial Management, Long Term Sources of Finance, Introductory idea about capitalization, Capital Structure, Concept of Cost of Capital, introduction, importance, explicit & implicit cost, Measurement of cost of capital, cost of debt.	**15**
IV	Concept & Components of working Capital. Factors Influencing the Composition of working Capital, Objectives of working Capital Management – Liquidity Vs. Profitability and working capital policies. Theory of working capital: Nature and concepts Cash Management, Inventory Management and Receivables Management.	**15**

Reference Books:

- Maheshwari & Maheshwari, "An Introduction to Accountancy", 8th Edition, Vikas Publishing House, 2003
- Gupta R.L., Gupta V.K., "Principles & Practice of Accountancy", Sultan Chand & Sons, 1999.
- Khan & Jain, "Financial Accounting"
- Maheshwari S.N., "Principles of Management Accounting", 11thEdition, Sultan Chand & Sons, 2001.
- Shukla and Grewal, "Advanced Accounts", 14th Edition, Sultan Chand & Sons.

BCA-24-606CC: Food, Nutrition and Hygiene

Course Outcome:

CO 1: Remember and understand the concepts related to food and nutrition.

CO 2: Apply principles of nutritive requirement during normal and special conditions and analyses related health issues.

CO 3: Evaluate the system of meal planning and create effective plans and strategies towards Nutrition requirements.

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	Concept of Food and Nutrition (a) Definition of Food, Nutrients, Nutrition, Health, balanced Diet (b) Types of Nutrition- Optimum Nutrition, under Nutrition, Over Nutrition (c) Meal planning- Concept and factors affecting Meal Planning Food groups and functions of food	**8**
II	Nutrients: Macro and Micro RDA, Sources, Functions, Deficiency and excess of (a) Carbohydrate (b) Fats (c) Protein (d) Minerals Major: Calcium, Phosphorus, Sodium, Potassium Trace: Iron, Iodine, Fluorine, Zinc (e) Vitamins Water soluble vitamins: Vitamin B, C Fat soluble vitamins: Vitamin A, D, E, K (f) Water (g) Dietary Fiber	**8**
III	1000 days Nutrition (a) Concept, Requirement, Factors affecting growth of child (b) Prenatal Nutrition (0 - 280 days): Additional Nutrients' Requirement and risk factors during pregnancy (c) Breast / Formula Feeding (Birth – 6 months of age) Complementary and Early Diet (6 months – 2 years of age)	**8**
IV	Community Health Concept (a) Causes of common diseases prevalent in the society and Nutrition requirement in the following: i. Diabetes ii. Hypertension (High Blood Pressure) Obesity iii. Constipation Diarrhea Typhoid (b) National and International Program and Policies for improving Dietary Nutrition (c) Immunity Boosting Food	**6**

Reference Books:

1. Singh, Anita, "Food and Nutrition", Star Publication, Agra, India, 2018.
2. 1000Days-Nutrition_Brief_Brain-Think_Babies_FINAL.pdf
3. https://pediatrics.aappublications.org/content/141/2/e20173716
4. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5750909/
5. Sheel Sharma,Nutrition and Diet Therapy,Peepee Publishers Delhi,2014,First Edition.

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