Semester-I

BCA-1-01T: Computer Programming

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

1. The syllabus prescribed should be strictly adhered to.
2. The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course: Computer Programming	
Course Code: BCA-1-01T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Gain a solid understanding of the fundamental concepts of programming in the C language, including variables, data types, control structures (such as loops and conditional statements), functions, and arrays.
CO2	Develop the ability to solve problems using C programming constructs, including the design and implementation of algorithms.
CO3	Acquire practical programming skills in C, including writing, compiling, debugging, and testing C programs.
CO4	Understand and apply best practices for C programming, including code readability, documentation, and code reuse.
CO5	Learn how to read from and write to files using C, including concepts such as file pointers and file I/O operations.

SECTION-A

Unit I: Introduction: Evolution of C Language, Character Set in C, Tokens, Keywords, Identifier, Constants, Variables, Rules for defining Variables, Data Types in C Language: Basic data type, Derived data type and Enum data type.

Unit II: Operators in C: Types of Operator: Arithmetic, Relational, Logical, Comma, Conditional, Assignment, Operator Precedence and Associativity in C, Input and Output Statements, Assignment statements.

Unit III: Control Structure: Sequential Flow Statement, Conditional Flow Statement, Decision Control statements: if, if-else, nested-if, else-if ladder. Loop control statements: While, do-while, for loop, Nested of Loops. Case Control Statements: Switch Statement, goto Statement, Break Statement, Continue Statement.

Unit IV: Arrays and Pointers in C: Arrays, Characteristic of Arrays, Representation, Declaration and Initialization of an Array, Types of Arrays: one dimensional, multi-dimensional arrays. Pointer, Pointers Declaration and Initialization, Types of Pointers, Pointer Expressions and Pointer Arithmetic.

SECTION-B

Unit V: Functions: Function in C, Function Declaration and Definition, Types of Functions, Library Vs. User-defined Functions, Function Calling Methods, Function Parameters: Actual Parameter, Formal Parameter, Parameter Passing Techniques: Call by Value and Call by Reference, Recursive Function, Pointers and Functions. Strings: C Strings, Difference between char array and string literal, Traversing String, Accepting string as the input, Pointers with strings, String Functions.

Unit VI: Structures & Unions: Structure, Structure Variables Declaration, Accessing Structure Data Members, Array of Structures, Nested of Structure, Passing structure to function, Structures Limitations, Union, Difference between Structure and Union in C.

Unit VII: 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).

Unit VIII: File Management in C: Introduction, Defining and opening a file, closing a file, Input/output and Error Handling on Files.

Reference Books:

- E. Balagurusamy, "Programming in C", Tata McGraw Hill.
- Kamthane, "Programming with ANSI and Turbo C", Pearson Education
- Rajaraman,V, "Fundamentals of Computers", PHI
- Kanetkar, "Let Us C", BPB Publications.

BCA-1-02T: Fundamentals of Computer

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 6
Pass Percentage: 40%

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

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2. The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course: Fundamentals of Computer	
Course Code: BCA-1-02T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Learn the basic knowledge of computer hardware and software
CO2	Get basic knowledge of number system
CO3	Gain knowledge of computer languages such as machine language, assembly language, high level language, 4GL.
CO4	Learn hands on experience with operating systems
CO5	Learn the computer networks, Information Technology and Society

Detailed Contents:

Module No.	Module Name	Module Contents
Section-A		
Module I	Introduction of Computer	Characteristics of the Computer, Block diagram of a Computer, Classification and Generations of

		Computer, **Input Devices:** Keyboard, Mouse, Trackball, Space ball, Joystick, Light pen, Touch screen, Digitizer, Data Glove, Scanner, Speech Recognition Devices, Optical Recognition Devices: OMR, OBR, OCR, MICR, Video Cameras, **Output Devices:** Monitors, Printers and its types, Plotters and its types, Speakers, Multimedia Projector.
Module II	**Number System**	Concept of Bit and Byte, Number System: Binary, Octal, Decimal and Hexadecimal System, Conversion from one system to the other. Binary Arithmetic: Addition, subtraction and multiplication. 1's compliment, 2's compliment, Subtraction using 1's compliment and 2's compliment.
Module III	**Computer Languages**	Machine language, assembly language, high level language, 4GL. Language Translators: Compiler, Interpreter, and Assembler. Software: Types of Software: System Software, Application Software, and Firmware. Memories: Memory Hierarchy, Memory Types: Magnetic core, RAM, ROM, Secondary, Cache, Overview of storage devices: floppy disk, hard disk, compact disk, tape.
Section-B		
Module IV	**Operating System**	Functions of Operating System, Types of Operating System, Turning on a computer, desktop, taskbar, start menu, booting up, Desktop, Shortcut, Icons, Recycle Bin, Start Menu, My Computer, Computer's Devices and Drives, Storage, Removable Storage, CD/DVD Drive, floppy drive, and USB flash drive, Hard drive, Control Panel, The Window, Parts of Window, File Explorer, Files, Folders, Directories, Command, Menus, Keyboard, Function Keys, Normal Keys, Special keys, Direction keys, Numeric Keypad, Numeric Keys, Mouse: Left button, Right Button, Windows Accessories, Sharing Information between Programs. Virus, Antivirus, Peripherals can use with your computer.
Module V	**Computer Networks**	Components of data communication, modes of communication, standards and organizations, Network Classification, Network Topologies; Network Types, Transmission media, network protocol; layered network architecture. Basic of

		Computer networks: LAN, MAN, WAN.
Module VI	Information Technology and Society	Applications of Information Technology in Business and Industry, Railway, Airline, Entertainment, Banking, Insurance, Inventory Control, Hotel Management, Education and Training, Mobile Phones, Information Kiosks, Weather Forecasting, Scientific Application.

Books

1. Pradeep K., Sinha, "Computer Fundamentals: Concepts, Systems & Applications", BPB
2. Rajaraman V, "Fundamentals of Computers", PHI
3. RS Salaria, "Computer Fundamentals", Kanna Publication, 1st Ed., 2017
4. E Balagurusamy, "Fundamentals of Computers", Mc Graw Hill, 2012
5. Glenn Brookshear, "Computer Science: An Overview", Pearson, 2012

BCA-1-03T: Probability & Statistical Analysis

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 6
Pass Percentage: 40%

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

1. The syllabus prescribed should be strictly adhered to.
2. The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short q questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course: Probability & Statistical Analysis	
Course Code: BCA-1-03T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Apply measures of central tendency for analysis of data.
CO2	Learn tabulated and graphical representation techniques for discrete and continuous data.
CO3	Infer the concept of correlation and regression for two or more related variables.
CO4	Understand the fundamentals of statistics to apply descriptive measures and probability for data analysis.
CO5	Understand the concepts of Random Variable, Probability Mass Function and Density Function.

SECTION-A

Unit I: Origin and Development of Statistics: Scope, limitation and misuse of statistics. Types of data: primary, secondary, quantitative and qualitative data. Types of Measurements: nominal, ordinal, discrete and continuous data.

Unit II: Presentation of Data by Tables: construction of frequency distributions for discrete and continuous data, graphical representation of a frequency distribution by histogram and frequency polygon, cumulative frequency distributions. Classification and Graphical representation of data (Pie Chart, Bar Diagram, Histogram, Frequency Polygon, Ogive Curve, etc.).

Unit III: Measures of Central Tendency: Arithmetic Mean, Median and Mode and its Graphical representation, Measures of dispersion – range, variance, mean deviation, standard deviation and Coefficient of variation, Concepts and Measures of Skewness and Kurtosis.

Unit IV: Descriptive Statistics: Exploratory data analysis, Coefficient of variation, Data visualization, Scatter diagram, Grouped data.

SECTION-B

Unit V: Correlation: Scatter plot, Karl Pearson coefficient of correlation, Spearman's rank correlation coefficient, multiple and partial correlations (for 3 variates only). Regression: Introduction to regression analysis: Modelling a response, overview and applications of regression analysis, Simple linear regression (Two variables)

Unit VI: Mathematical and Statistical probability: Elementary events, Sample space, Compound events, Types of events, Random experiment, sample point and sample space, event, algebra of events.

Unit VII: Definition of Probability: classical, empirical and axiomatic approaches to probability, properties of probability. Theorems on probability, conditional probability and independent events

Unit VIII: Statistical inference: Concept of Random Variable, Probability Mass Function & Density Function, Mathematical Expectation (meaning and properties), Moments, Moment Generating Function and Characteristic Function.

Reference Books:

- Gupta, S.C. and Kapoor, V.K., "Fundamentals of Mathematical Statistics", Sultan & Chand & Sons, New Delhi, 11th Ed.

- Hastie, Trevor, et al. "The elements of Statistical Learning", Springer.

- Ross, S.M., "Introduction to Probability and Statistics", Academic Foundation.

- Papoulis, A. and Pillai, S.U., "Probability, Random Variables and Stochastic Processes", TMH.

BCA-1-01P: Computer Programming Lab

Total Marks: 50
External Marks: 15
Internal Marks: 35
Credits: 2
Pass Percentage: 40%

Course: Computer Programming Lab	
Course Code: BCA-1-01P	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Develop C programs to solve simple mathematical and decision making problems.
CO2	Develop, Debug and Execute programs to demonstrate the applications of arrays in C
CO3	Develop, Debug and Execute programs to demonstrate decision making and looping constructs in C
CO4	Develop, Debug and Execute programs to demonstrate the basic concepts of pointers in C
CO5	Implement programs to read from and write to files using C, including concepts such as file pointers and file I/O operations.

Detailed List of Programs:

Programme No.	Name of Program
P1	Write a simple program that prints "Hello, World!" to the console.
P2	Take two numbers as input and display their sum.
P3	Generate and print the multiplication table for a given number.
P4	Compute the factorial of a given number.
P5	Check whether a given number is prime or not.
P6	Generate and display the Fibonacci series up to a specified number of terms.
P7	Determine if a given number or string is a palindrome.
P8	Reverse a given string without using library functions.
P9	Implement a sorting algorithm (e.g., bubble sort, selection sort) for an array of integers.
P10	Search for an element in an array using linear search.
P11	Implement binary search for a sorted array.

P12	Perform addition of two matrices.
P13	Find and display the transpose of a matrix.
P14	Implement a program to calculate the power of a number using recursion.
P15	Create a basic calculator program that performs addition, subtraction, multiplication, and division.
P16	Compute the factorial of a number using a recursive function.
P17	Check whether a given number is an Armstrong number.
P18	Calculate the GCD of two numbers using Euclidean Algorithm.
P19	Convert a decimal number to its binary equivalent.
P20	Reverse the words in a given sentence without using library functions.
P21	WAP that swaps the values of two numbers using pointers.
P22	WAP that reverses an array using pointers.
P23	WAP hat passes an array to a function and calculates the sum of its elements.
P24	WAP that reads data from a file and prints it to the console.
P25	WAP that appends data to an existing file.

BCA
Semester-I
BCS-2-01T: Basic Communication Skills

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 6
Pass Percentage: 40%

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

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3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course: Basic Communication Skills	
Course Code: BCS-2-01T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Gain competence in verbal and non-verbal communication
CO2	Increase comprehension levels
CO3	Use language for effective communication
CO4	Understand the processes of communication
CO5	Overcome barriers in communication

Detailed Contents:

Module	Module Name	Module Contents
Section-A		
Section-A		
Module I	Understanding Human Communication:	Constitutive Processes of Communication, Language as a tool of communication, Barriers to Effective communication, Strategies to Overcome the Barriers, Non-Verbal Communication, Importance of Non-Verbal Communication, Non-Verbal Communication and Cultural influences
Module II	Listening Comprehension	Difference between Hearing and Listening, Effective Listening Strategies, Listening in Conversational Interaction
Module III	Speaking Skills	Expressions in different Communicative Functions: Asking Questions; Making Requests and suggestions; Expressing Greetings, Apologies and Gratitude Job Interviews, Group Discussions, Presentation Skills
Section-B		
Module IV	Reading Comprehension	Introduction, Reading Process, Reading different kinds of Texts, Reading Methods- Using KWL for reading comprehension
Module V	Effective Written Communication	Constituents of Effective Writing, Coherence and Cohesion for effective writing
Module VI	Business Correspondence	Letter writing, Resume/CV, E mails for Communication, Writing Reports, Describing Tables and Charts, Meetings: Agenda and Minutes

Books

1. Koneru, Aruna. Professional Communication. Delhi: McGraw. 8th Ed, 2017.

2. Mahanand, Anand. English for Academic and Professional Skills. Delhi: McGraw, 2013.

3. Rani, D Sudha, TVS Reddy, D Ravi, and AS Jyotsna. A Workbook on English Grammar and Composition. Delhi: McGraw, 2012.

4. Rizvi, M. Ashraf. Effective Technical Communication. Delhi: McGraw, 2nd Ed. 2017

COURSE NAME: SIKH HERITAGE AND ETHOS

COURSE CODE: BCA-1-VEC-1

(QUALIFYING/NON-CREDIT COURSE)

Course: Sikh Heritage and Ethos	
Course Code: BCA-1-VEC-1	
Course Outcomes (COs)	
After the completion of this course, the students will be able to:	
CO1	Gain a comprehensive understanding of the beliefs, practices, and history of Sikhism, including its origins, scriptures, and key principles.
CO2	Understand the historical context in which Sikhism emerged, including the life and teachings of the Sikh Gurus, the development of the Sikh community, and key historical events.
CO3	Develop an appreciation for the core values of Sikhism, such as equality, justice, compassion, and service to others.
CO4	Understand Sikh cultural practices, traditions, and contributions to art, music, literature, and architecture.
CO5	Develop an understanding of Sikhism in relation to other faith traditions, as well as the importance of interfaith dialogue and cooperation.

Unit 1: Introduction to Sikhism: Ten Sikh Gurus: Brief Introduction;

Shri Guru Granth Sahib Ji: Brief Introduction

Unit II: The Sikh Martyrs- Bhai Matidas Ji, Bhai Dayala Ji, Bhai Satidas, Baba Banda Singh Bahadur, Bhai Mani Singh, Bhai Taru Singh, Bhai Subeg Singh, Shahbaz Singh, Baba Deep Singh Ji

Unit III: Leading Sikh Women personalities - Bebe Nanki Ji, Mata Khivi Ji, Bibi Bhani Ji, Mata Gujri Ji, Mata Sahib Kaur Ji

Unit IV: Leading Sikh personalities of Sikhism - Bhai Mardana Ji, Baba Buddha Ji, Bhai Gurdas Ji, Bhai Nandlal Ji, Bhai Ghanaiya Ji

Unit V: Sikh Ethos- Panj Piyare, Chaar Sahibzade and Chaali Muktey, Sikhism: Daily Routine, Principles, Prayers

Semester-II

BCA-2-01T: Operating Systems

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 4
Pass Percentage: 40%

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

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3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short q questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course: Operating Systems
Course Code: BCA-2-01T
Course Outcomes (COs) After the completion of this course, the students will be able to:

CO1	Understand the structure of computing systems, from the hardware level through the operating system level and onto the applications level.
CO2	Understand basics of operating system viz. system programs, system calls, user mode and kernel mode.
CO3	Learn the working with CPU scheduling algorithms for specific situation, and analyze the environment leading to deadlock and its rectification.
CO4	Explore the memory management techniques viz. caching, paging, segmentation, virtual memory, and thrashing.
CO5	Apply Methods for Handling Deadlocks, Deadlock Prevention, and Recovery from Deadlock.

SECTION-A

Unit I: Introduction and System Structures: Computer-System Organization, Computer-System Architecture, Operating-System Structure, Operating-System Operations, Process

Management, Memory Management, Storage Management, Protection and Security, Computing Environments, Operating-System Services, User and Operating-System Interface, System Calls, Types of System Calls, System Programs.

Unit II: Process Management: Process Concept, Process Scheduling, Operations on Processes, Multi-threaded programming; Multithreading Models, Process Scheduling: Basic Concepts, Scheduling Criteria, and Scheduling Algorithms.

Unit III: Deadlock: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

Unit IV: Memory Management: Basic Hardware, Address Binding, Logical and Physical Address, Dynamic linking and loading, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Demand Paging, Page Replacement algorithms

SECTION-B

Unit V: File Systems: File Concept, Access Methods, Directory and Disk Structure, File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free-Space Management.

Unit VI: Introduction to Linux: Linux's shell, Kernel, Features of Linux, using file system: Filenames, Introduction to different types of directories: Parent, Subdirectory, Home directory; rules to name a directory, Important directories in Linux File System,

Unit VII: Linux Commands: Cal, date, echo, bc, who, cd, mkdir, rmdir, ls, cat cp, rm, mv, more, gzip, tar, File ownership, file permissions, chmod, Directory permission, change file ownership,

Unit VIII: Shell Scripting: Creating and Executing Shell Programs, using variables: Assigning a value to a variable, Accessing the value of a variable, Positional Parameters and other Built-In Shell Variables; Special Characters, Conditional Statements: if Statement, case Statement; Iteration Statements: for Statement, while Statement, until Statement

Reference Books:

- Silberschatz and Galvin, "Operating System Concepts", Addison-Wesley publishing.
- Nutt Gary, "Operating Systems", Addison Wesley Publication.
- Hansen, Per Brinch, "Operating System Principles", Prentice-Hall.
- N. Haberman, "Introduction to Operating System Design", Galgotia Publications.
- Hansen, PerBrich, "The Architecture of Concurrent Programs", PHI.
- Shaw, "Logical Design of Operating System", PHI.

BCA-2-02T: Python Programming

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

1. The syllabus prescribed should be strictly adhered to.
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3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course: Python Programming	
Course Code: BCA-2-02T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Explain the basic syntax and structure of Python programs.
CO2	Understand variables, data types, and basic operations.
CO3	Understand and use common programming constructs like loops and conditionals.
CO4	Define and use functions in Python.
CO5	Understand the basics of object-oriented programming in Python.

Detailed Contents:

Module	Module Name	Module Contents
Section-A		
Module 1	**Introduction to Python**	Python installation and setup, Command line Basics; Python Objects and Data Structures Basics: Introduction to Python data types,

		Variable assignments, Numbers, String, String methods, Lists, Python Comparison Operators: Chaining comparison operators with logical operators, Pass Break and continue.
Module II	Program Flow control & Methods and Functions in Python	**Program Flow control in Python:** If, Elif and Else statements in python, for loops, While loops **Methods and Functions in python:** Introduction to functions, Def keyword, User defined functions, arguments and parameters, Parameter naming in python
Section-B		
Module III	Object Oriented Programming	Introduction, Classes and objects, attributes and methods, Inheritance and polymorphism, Special methods; Modules and Packages: Pip install and PyPi.
Module IV	Use of Python Libraries and File handling in Python	**Python Libraries:** Utilize common Python libraries for specific tasks (e.g., NumPy for numerical computing, Pandas for data manipulation). Use libraries for data manipulation, analysis, and visualization. **File Handing in Python:** Files in python, importing own files, Read and writing text files, working with CSV, XML and JSON files.

Books

1. Timothy Budd, "Exploring Python", TMH, 1ˢᵗ Ed, 2011
2. Allen Downey, Jeffrey Elkner, Chris Meyers, "How to think like a Computer Scientist: learning with Python", Green Tea Pr, 2002
3. Paul Barry, "Head First Python: A Brain-Friendly Guide", O'Reilly, 2nd ed. 2016
4. Udemy, https://www.udemy.com/course/complete-python-bootcamp/
5. Udemy,https://www.udemy.com/course/python-the-complete-python-developer-course

BCA

Semester-II

FDM-1-02T: Fundamentals of Digital Marketing

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 6
Pass Percentage: 40%

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

1. The syllabus prescribed should be strictly adhered to.
2. The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short q questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course: Digital Marking	
Course Code: FDM-1-02T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Identify the core concepts of digital marketing and its role in businesses or organizations.
CO2	Understand digital marketing strategies to reach the target audience.
CO3	Analyze marketing approaches and recognize areas for enhancing performance.
CO4	Resolve digital marketing issues and offer solutions based on the vital examination of digital marketing information.
CO5	Work on social media platforms such as Twitter, Facebook and Instagram

Detailed Contents:

Module	Module Name	Module Contents
Section A		
Module 1	Introduction to Digital Marketing	Concepts, Traditional Marketing vs. Digital Marketing, Digital Market Evolution, Career in Digital Marketing.
Module II	Digital Consumer	Consumer Characteristics and profiles, Information Search Behavior, Factors Influencing Consumption Behavior, Purchase Decision Process, Post Purchase Behavior and Management.
Module III	Digital vs Non- Digital Marketing Strategy	Digital vs Non- Digital Marketing Strategy, Digital Marketing Decisions- Product, Price, Distribution and Promotion.
Section B		
Module IV	Digital Marketing Strategy Formulation and Execution Digital Marketing Mechanisms	Digital Marketing Strategy Formulation and Execution Digital Marketing Mechanisms: Websites- Company and Retail Service Providers, Search.
Module V	Search Engines	Search Engines- Google, Bing, Ask, Yahoo Video Hosting and Entertainment-Youtube, Wimeo, Amazon Prime, Netflix, Hotstar.
Module VI	Social Media	Mobile Phones, E- Mails, Blogs, Social Media: Facebook, Instagram, Twitter, Whatsapp.

Books

1. Seema Gupta, "Digital Marketing", McGraw Hill Education

2. PModule Singh Bhatia, "Fundamentals of Digital Marketing", Pearson

3. Philip Kotler, "Marketing 4.0: Moving from Traditional to Digital", Wiley

BCA-2-01P: Operating Systems Lab

Total Marks: 50
External Marks: 15
Internal Marks: 35
Credits: 2
Pass Percentage: 40%

Course: Operating Systems Lab	
Course Code: BCA-2-01P	
Course Outcomes (COs)	
After the completion of this course, the students will be able to:	
CO1	Demonstrate the installation process of various operating systems.
CO2	Implement virtualization by installing Virtual Machine software.
CO3	Apply UNIX/LINUX operating system commands.
CO4	Understand different UNIX/LINUX shell scripts
CO5	Implement and execute various shell programs.

Detailed List of Programs:

Programme No.	Name of Program
P1	Install UNIX/LINUX – Complete Step by Step
P2	Study of Basic UNIX Commands and various UNIX editors such as vi, ed, ex and EMACS
P3	Write a shell script that deletes all lines containing the specified word in one or more files Supplied as arguments to it.
P4	Write a shell script that displays a list of all files in the current directory to which the user has read, write and execute permissions
P5	Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or directory and reports accordingly. Whenever the argument is a file it reports no of lines present in it
P6	Write a shell script that accepts a list of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.
P7	Write a shell script to list all of the directory files in a directory

P8	Write a shell script to find factorial of a given number
P9	Write an awk script to count number of lines in a file that does not contain vowels
P10	Write an awk script to find the no of characters ,words and lines in a file
P11	Implement in C language, the following Unix commands using system calls a) cat b) ls c) mv
P12	Write a C program that takes one or more file/directory names as command line input and reports following information
P13	Write a C program to list every file in directory, its inode number and file name
P14	Write a C program to create zombie process
P15	Write a C program to illustrate how an orphan process is created
P16	Write client server programs using c for interaction between server and client process using Unix Domain sockets

BCA-2-02P: Python Programming Lab

Total Marks: 50
External Marks: 35
Internal Marks: 15
Credits: 2
Pass Percentage: 40%

Course: Python Programming Lab
Course Code:BCA-2-02P
Course Outcomes (COs)
After the completion of this course, the students will be able to:

CO1	Demonstrate proficiency in writing Python code to solve simple problems.
CO2	Use and manipulate basic data structures in Python, such as lists, tuples, and dictionaries.
CO3	Solve algorithmic problems using Python.
CO4	Utilize common Python libraries for specific tasks (e.g., NumPy for numerical computing, Pandas for data manipulation).
CO5	Use libraries for data manipulation, analysis, and visualization.

Detailed List of Programmes:

Programme No.	Name of Programme
P1	WAP to find the sum of two numbers
P2	WAP to find Area of Rectangle and Circle
P3	WAP to find Volume of Sphere
P4	WAP to find the maximum of three numbers in python
P5	WAP to print all the prime numbers between two numbers
P6	WAP to print FIBONACCI SERIES using WHILE Loop
P7	WAP to print FIBONACCI SERIES using FOR Loop
P8	WAP to calculate X^n by FOR Loop
P9	WAP to print FACTORIAL of List
P10	WAP to create a list of values inputted by user and sort in increasing order.
P11	WAP to find given number is PRIME or not.
P12	Demonstrate the use of polymorphism by creating different functions for sum.

P13	WAP to write an exception for divisibility of a number by 0.
P14	WAP to print the first 10 lines in text file using python
P15	Take a list of integers. WAP to find the pairs which give the minimum difference
P16	WAP to copy content from a file in a computer and paste it into another file.
P17	WAP to create a linked list using python
P18	Demonstrate the use of common Python libraries for specific tasks (e.g., NumPy for numerical computing, Pandas for data manipulation)
P19	Demonstrate the use of common Python libraries for data manipulation, analysis, and visualization.

BCA-2-ENVS: Environmental Studies

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

1. The syllabus prescribed should be strictly adhered to.
2. The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course: Environmental Studies	
Course Code: BCA-2-ENVS	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Gain a broad understanding of key environmental challenges, such as climate change, pollution, biodiversity loss, and resource depletion.
CO2	Understand the interconnected nature of environmental, social, economic, and political systems, and how they influence each other
CO3	Understand of natural systems, including ecosystems, and how they function, as well as human impacts on these systems.
CO4	Understand of sustainability principles and practices, including the ability to analyze and evaluate sustainability initiatives.
CO5	Knowledge the environmental laws, policies, and governance structures at local, national, and international levels.

Course Contents

SECTION-A

Unit I: Introduction - The multidisciplinary nature of environmental studies. Definition, scope and importance Concept of Biosphere –Lithosphere, Hydrosphere, Atmosphere.

Unit II: Ecosystem & Biodiversity Conservation- Ecosystem and its components, Types of Ecosystems, Biodiversity - Definition and Value, Threats to biodiversity and its conservation Level of biological diversity: genetic, species and ecosystem diversity; bio-geographic zones

of India; biodiversity patterns and global biodiversity hot spots. India as Mega-biodiversity nation; Endangered and endemic species of India.

Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and informational value.

Unit III: Natural Resources–Renewable and Non-Renewable Resources

Land resources and land use change; land degradation, soil erosion and desertification. Deforestation: causes and impacts due to mining, dam building on environment, Forests, Biodiversity and tribal populations.

Water: Use and over-exploitation of surface and ground water, Floods, droughts, conflicts over water (international & inter-state)

Energy resources: renewable and nonrenewable energy sources, use of alternate energy sources, growing energyneeds, case studies.

Unit IV: Environmental Pollution

Environmental Pollution: types, causes, effects and controls; Air, Water, Soil and noise pollution. Nuclear hazards and human health risks Solid waste management, Source Segregations: Control measures of urban and Industrial waste. Pollution case studies.

SECTION-B

Unit V: Environmental Protection Laws In India

Environmental protection act for; Air (Prevention and control of pollution), Water (Prevention and Control of pollution), Wild life, Forest Conservation, Issues involved in the enforcement of environmental legislation. Role of an individual in prevention of pollution. Environmental policies & Practices; Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture.

Unit VI: Human Communities and the Environment

Human population growth: Impacts on environment, human health and welfare, Sanitation & Hygiene. Resettlement and rehabilitation of project affected persons; case studies. Disaster management: floods, earthquake, cyclones and landslides. Environment movements: Chipko, Silent valley, Bishnois of Rajasthan. Environmental ethics: Role of Indian and other religions and cultures in environmental conservation for a Clean- green pollution free state. Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi)

Unit VII: Road safety awareness

Concept and significance of Road safety, Traffic signs, Traffic rules, Traffic Offences and penalties, how to obtain license, Role of first aid in Road Safety.

Unit VIII: Stubble Burning

Meaning of Stubble burning. Impact on health & environment. Management and alternative uses of crop stubble. Environmental Legislations and Policies for Restriction of Agriculture Residue Burning in Punjab.

Books:

1. Carson, R. Silent Spring, Houghton Mifflin Harcourt, 2002.

2. Gadgil. M., & Guha,R. This Fissured Land: An Ecological History of India. Univ. of California Press, 1993.

3. Gleeson, B. and Low, N.(eds.) Global Ethics and Environment, London, Routledge, 1999.

4. Gleick,P.H. Water in Crisis.Pacific Institute for Studies in Dev. Environment & Security. Stockholam Env.Institute, Oxford Univ. Press, 1993.

5. Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll. Principles of Conservation Biology. Sunderland :Sinauer Associates, 2006.

6. Grumbine, R. Edward, and Pandit, M.K. Threats from India's Himalays dams. Science,339-36-37,2013.

7. McCully,P. Rivers no more: the environmental effects of dams (pp.29-64). Zed Books, 1996
8. McNeill, John R. Something New Under the Sun: An Environmental History of the Twentieth Century, 2000.
9. Pepper, I.L., Gerba,C.P & Brusseau, M.L. Environmental and Pollution Sciences. Academic Press, 2011.
10. Rao, M.N. & Datta, A.K. Waste Water Treatment. Oxford and IBH Publishing Co. Pvt.Ltd, 1987.
11. Raven, P.H., Hassenzahl, D.M. & Berg, L.R., Environment. 8Th edition. John Wiles & Sons, 2012.
12. Rosencranz, A., Divan, S., & Nobie, M.L. Environmental law and policy in India. Tripathi, 2001.
13. Sengupta, R. Ecology and economics: An approach to sustainable development. OUP, 2003.
14. Singh, J.S., Singh, S.P. and Gupta, S.R. Ecology, Environmental Science and Conservation. S. Chand Publishing,New Delhi, 2014.
15. Sodhi, N.S. Gibson, L. & Raven, P.H. (eds). Conservation Biology: Voices from the Tropics. John Wiley & Sons,2013.
16. Wilson, E.O. The Creation: An appeal to save life on earth. New York: Norton, 2006.
17. World commission on Environment and Development. Our Common Future. Oxford University Press, 1987.

BCA-2-VEC-2: Human Rights and Duties

<div align="right">

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 4
Pass Percentage: 40%

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INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

1. The syllabus prescribed should be strictly adhered to.
2. The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course: Human Rights and Duties	
Course Code: BCA-2-VEC-2	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Gain a comprehensive understanding of human rights principles, including the Universal Declaration of Human Rights and other relevant international and regional instruments.
CO2	Understand the legal frameworks and mechanisms for protecting human rights at the international, regional, and national levels.
CO3	Understand the historical development of human rights concepts and movements, including key events and figures.
CO4	Analyze human rights issues and challenges, including discrimination, inequality, and violations of human rights.
CO5	Develop skills in advocating for human rights and engaging in activism to promote and protect human rights.

Section-A

(Introduction to Human Rights)

Unit I- Foundational Aspects: Meaning, Characteristics; Classification; Generations of Human Rights.

Unit II-Constitutional-Legal Recognition in India: Fundamental Rights; Directive Principles of State Policy.

Section B

(Introduction to Human Duties)

Unit I- Conceptual Perspective: Meaning, Nature & Characteristics of Human Duties; Classification of Human Duties; Relevance of Human Duties.

Unit II- Recognition to Human Duties in India: Fundamental Duties in Indian Constitution Part IV A.

Books:
1. United Nations. The United Nations and Human Rights 1945-1995. Geneva: United Nations Blue Books Series, Vol. VII, 1996.
2. Sastry, S. N. Introduction to Human Rights and Duties. Pune: University of Pune Press, 2011.
3. Mertus, Julie. The United Nations and Human Rights-A Guide for a New Era. London: Routledge, 2009.
4. Donnelly, Jack. Universal Human Rights in Theory and Practice. New York: Cornell University Press, 2013.
5. Hammarberg, Thomas. Taking Duties Seriously- Individual Duties in International Humanitarian Law. Versoix: International Council on Human Policy, 1999.
6. Miller P. Frederic, et al. Fundamental Rights, Directive Principles and Fundamental Duties in India. New York: VDM Publishing, 2009.
7. Deol, Satnam Singh. Human Rights in India-Theory and Practice. New Delhi: Serials Publications, 2011
7. lications, 2011.

28/01/25

Semester-III

28/01/25

BCA-3-01T: Data Base Management System (DBMS)

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

1. The syllabus prescribed should be strictly adhered to.
2. The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short q questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course: DBMS	
Course Code: BCA-3-01T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Understand the fundamental elements of database management system.
CO2	Understands the three level architecture of DBMS and mapping between these levels.
CO3	Familiar with the hierarchical model, network model, entity relationship model and relational model.
CO4	Acquire knowledge of normalization technique that reduces data redundancy and eliminates undesirable characteristics like Insertion, Update and Deletion Anomalies.
CO5	Apply SQL and PL/SQL to solve problems

SECTION-A

Unit I: Introduction of DBMS: Database Approach, Characteristics of a Database Approach, Database System Environment. Roles in Database Environment: Database Administrators, Database Designers, End Users, Application Developers. Database Management Systems:

Definition, Characteristics, Advantages of Using DBMS Approach, Classification of DBMSs.

Unit II: Three Level Architecture of DBMS: Database Schema and Database Instance, Mapping Between Different Views, Data Independence–Physical and Logical Data Independence, Difference between logical data independence and physical data independence, Components of a DBMS, Data Dictionary, DBMS Languages

Unit III: Data Models: Classification of Data Model, Hierarchical Model, Network Model, Entity Relationship Model, Database Conceptual Modeling by E-R model: Concepts, Entities and Entity Sets, Attributes, Mapping Constraints, E-R Diagram, Weak Entity Sets, Strong Entity Sets, Comparison between Data Models.

Unit IV: Relational Data Model: Concepts and Terminology. Constraints: Integrity Constraints, Entity and Referential Integrity constraints, Keys: Super Keys, Candidate Keys, Primary Keys, Secondary Keys and Foreign Keys. Relational Algebra: Basic Operators, Additional Operators. Relational Calculus: Tuple Relational Calculus and Domain Relational Calculus, Difference between relational algebra and relational calculus.

SECTION-B

Unit V: Normalization: Functional Dependency, Full Functional Dependency, Partial Dependency, Transitive Dependency, Normal Forms– 1NF, 2NF, 3NF, BCNF, Multi-valued Dependency, Join Dependency and Higher Normal Forms-4NF, 5NF.

Unit VI: Transaction Management and Concurrency Control: ACID Properties. Database Protection: Security Issues, Discretionary Access Control-Granting and Revoking Privileges. Database Concurrency: Problems of Concurrent Databases, Serializability and Recoverability, Concurrency Control Methods-Two Phase Locking, Time Stamping. Deadlock, Database security and integrity, Different Methods of Database Security, Database Recovery: Recovery Concepts, Recovery Techniques-Deferred Update, Immediate Update, Shadow Paging.

Unit VII: Introduction to SQL: Introduction to SQL*PLUS, Data types, Parts of SQL: Data Definition Language, Data Manipulation Language, Data Control Language, and Transaction Control Language. SQL Operators, SQL Functions, Joins, Roll up operation, Cube operation, Nested query, Subquery, View, Disadvantages of SQL

Unit VIII: Introduction to PL/SQL: Difference between SQL and PL/SQL, Block structure of PL/SQL, Architecture of PL/SQL, Elements and Data Types of PL/SQL, Variables and Constants of PL/SQL, Control structures of PL/SQL, Cursors, Exception handling, Subprograms, Stored packages, Triggers

Reference Books:
- Elmasry Navathe, "Fundamentals of Database System", Pearson Education.
- Oracle SQL Complete Reference", Tata McGraw-Hill.
- T.Connolly, C Begg,"Database Systems", Pearson Education.
- Jeffrey D. Ullman, "Principles of Database Systems", Galgotia Publications.

- Henry F. Korth, A. Silberschhatz, "Database Concepts", Tata McGraw Hill.
- C. J. Date, "An Introduction to Database Systems", Pearson Education.

BCA-3-02T: Data Structures

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

1. The syllabus prescribed should be strictly adhered to.
2. The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short q questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course: Data Structures	
Course Code: BCA-3-02T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Understand basic data structures such as arrays, linked lists, stacks and queues.
CO2	Solve problem involving graphs, trees and heaps.
CO3	Apply stack for evaluation of arithmetic expressions, and conversion from infix to post fix and recursion.
CO4	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data.
CO5	Design algorithm in context of space and time complexity and apply asymptotic notation.

SECTION-A

Unit I: Data Structure: Introduction to data structure and algorithm, various phases of algorithms, Pointers, working with pointers, pointers and function, structure, union, classification of data

structures Algorithm analysis: Time space trade off algorithms and Big O notation.

Unit II: Arrays: Introduction, one dimensional and multidimensional arrays, memory representation of arrays, operations on arrays, sparse arrays and sparse matrices and their implementation, Advantages and limitation of arrays.

Unit III: Linked List: Introduction; operation on linked list, circular linked list, doubly linked list, header linked list, implementation of linked list, application of linked lists.

Unit IV: Stacks: Introduction; array representation of stacks, Operation on stacks; Linked representation of stacks, Application of stacks: matching parenthesis, evaluation of arithmetic expressions, and conversion from infix to post fix, recursion.

SECTION-B

Unit V: Queues: Introduction, operation on queues, linked representation of queue, Applications of queues, circular queue, memory representation of queues.

Unit VI: Trees: Introduction; Binary Tree; Complete Binary Trees, Extended Binary Trees, representation of binary trees in the memory, traversing a binary tree, Binary Search Tree, Operations on Binary Search Tree; Heap, Applications of trees.

Unit VII: Graphs: Introduction Graph: Graph terminology, Memory Representation of Graphs: adjacency matrix representation of graphs, adjacency list or linked representation of graphs, graph traversal algorithms, Operations performed on graphs.

Unit VIII: Searching: Linear Search, Binary Search, Fibonacci Search, Sorting: Selection Sort, Insertion Sort, Merge Sort, Quick Sort and Heap Sort.

Reference Books:
- A. Tanenbaum, Y. Lanhgsamand A. J. Augenstein, "Data Structures Using C", PHI.
- Loomis, Marry, "Data Management and File Structures", PHI
- Seymour Lipschultz, "Theory and Practice of Data Structures", Tata McGraw-Hill.
- E. Horowitz and S. Sahni, "Data Structures with Pascal", Galgotia.
- M. J. Folk, B. Zoellick, G Riccardi, "File Structures", Pearson Education.

BCA-3-03T: Computer System Architecture

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 4
Pass Percentage: 35%

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

1. The syllabus prescribed should be strictly adhered to.
2. The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short q questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course: Computer System Architecture	
Course Code: BCA-3-03T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Explain the organization of basic computer , its design and the design of control unit.
CO2	Demonstrate the working of central processing unit and RISC and CISC Architecture.
CO3	Describe the operations and language of the register transfer, micro operations and input- output organization.
CO4	Understand the organization of memory and memory management hardware.
CO5	Elaborate advanced concepts of computer architecture, Parallel Processing, inter processor communication and synchronization.

Section A

Unit I: Basics of Data Representation- Number System, Conversions of Number Systems, 1's and 2's Complements, fixed and floating point representation, character representation, addition, subtraction, magnitude comparison.

Unit II: Introduction to Boolean algebra - Logic gates, Boolean algebra, K-Maps, Sum of Products, Product of Sums.

Unit III: Combinational circuits and Sequential Circuits: decoders, multiplexors, Encoders, DE-multiplexers Half Adders, Full Adders, Flip Flops, registers, counters and memory units.

Unit IV: Basic Computer Organization and Design- Computer Architecture, Structure, Computer registers, Common Bus Systems, Arithmetic, Logical, Shift Micro-operations, and Design of ALU.

Section B

Unit V: Timing and Control Unit-Instruction cycle, Memory reference instructions, Register reference instructions, Input-output instructions, Design of Timing and Control Unit.

Unit VI: Design of Central Processing Unit: Register organization, stack organization, Register Organization, one address instructions, two address instructions, and three address instructions. Instruction formats, addressing modes.

Unit VII: Input-Output Organization: I/O interfaces, Data transfer schemes. I/O control mechanisms - Program controlled, Interrupt controlled and DMA controller.

Unit VIII: Memory Unit: Memory hierarchy, High-speed memories, Organization of a Cache memory unit, Virtual memory, Memory management.

Reference Books

- Mano, Morris M., "Computer System Architecture", 3rd ed., Prentice Hall, 2007

- Hayes, J.P., "Computer Architecture and Organization", McGraw Hill, 1998

- Hennessy, J.L., Patterson, D.A, and Goldberg, D., "Computer Architecture a Quantitative Approach", Pearson Education Asia, 2005

- Leigh, W.E. and Ali, D.L., "System Architecture: software and hardware concepts", South Western Publishing Co., 2000

BCA-3-04T: Introduction to Data Science

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 6
Pass Percentage: 40%

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

1. The syllabus prescribed should be strictly adhered to.
2. The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short q questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course: Introduction to Data Science	
Course Code: BCA-3-04T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Understand tools and techniques to analyze and extract insights from data received from different data sources such as social media, IoT devices, and sensors.
CO2	Understand the general techniques and frameworks that can be used to handle special types of data, such as acoustic, image, sensor, and network data
CO3	Apply mathematical or logical operations to the data to derive new insights.
CO4	Apply tools for understanding complex data structures and relationships.
CO5	Explore various applications of data science in the field of business, energy, health care, biotechnology, manufacturing, telecommunication, pharmaceuticals etc.

SECTION-A

Unit I: Data Science: A discipline, Landscape-Data to Data science, Data Growth-issues and challenges, data science process. foundations of data science. Messy data, Anomalies and artefacts in datasets. Cleaning data.

Unit II: Introduction data acquisition: Structured Vs Unstructured data, data preprocessing techniques including data cleaning, selection, integration, transformation and reduction, data mining, interpretation.

Unit III: Representation of Data: Special types-acoustic, image, sensor and network data. Problems when handling large data – General techniques for handling large data, Distributing data storage and processing with Frameworks.

Unit IV: Data Science Ethics: Doing good data science, Owners of the data, valuing different aspects of privacy, getting informed consent, the five Cs, diversity, inclusion, future trends.

SECTION-B

Unit V: Data Wrangling Combining and Merging Data Sets: Reshaping and Pivoting, Data Transformation, String manipulations, Regular Expressions.

Unit VI: Data Aggregation and Group Operations: Group by Mechanics, Data Aggregation, Group Wise Operations, Transformations, Pivot Tables, Cross Tabulations, Date and Time data types.

Unit VII: Data Modeling: Basics of Generative modeling and Predictive modeling. Charts-histograms, scatter plots, time series plots etc. Graphs, 3D Visualization and Presentation.

Unit VIII: Applications of Data Science: Business, Insurance, Energy, Health care, Biotechnology, Manufacturing, Utilities, Telecommunication, Travel, Governance, Gaming, Pharmaceuticals, Geospatial analytics and modeling

Reference Books:

- Sinan Ozdemir, "Principles of Data Science", Packt Publishing, 2016.
- Joel Grus, "Data Science from Scratch", O'Reilly, 2016.
- Foster Provost & Tom Fawcett, "Data Science for Business", O'Reilly, 2013.
- Roger D. Peng & Elizabeth Matsui, "The Art of Data Science", Lean Publishing, 2015.

BCA-3-01P: Data Base Management System (DBMS) Lab

Total Marks: 50
External Marks: 15
Internal Marks: 35
Credits: 2
Pass Percentage: 40%

Course: DBMS Lab	
Course Code: BCA-3-01P	
Course Outcomes (COs)	
After the completion of this course, the students will be able to:	
CO1	Implement Basic DDL, DML and DCL commands.
CO2	Understand Data selection and operators used in queries and restrict data retrieval and control the display order.
CO3	Use Aggregate and group functions to summarize data.
CO4	Join multiple tables using different types of joins.
CO5	Understand the PL/SQL architecture and write PL/SQL code for procedures, triggers, cursors, exception handling etc.

Detailed List of Programs: Detailed List of Programs:

Programme No.	Name of Program
P1	Implementation of DDL commands of SQL with suitable examples • Create table • Alter table • Drop Table
P2	Implementation of DML commands of SQL with suitable examples • Insert • Update • Delete
P3	Implementation of different types of function with suitable examples • Number function • Aggregate Function • Character Function • Conversion Function • Date Function
P4	Implementation of different types of operators in SQL • Arithmetic Operators • Logical Operators • Comparison Operator • Special Operator • Set Operation

P5	Implementation of different types of Joins
	• Inner Join
	• Outer Join
	• Natural Join etc.
P6	Implementation of
	• Group by & having clause
	• Order by clause
	• Indexing
P7	Implementation of
	• Sub queries
	• Views
P8	Study & Implementation of different types of constraints.
P9	Study & Implementation of Database Backup & Recovery commands.
P10	Study & Implementation of Rollback, Commit, Save point
P11	Creating Database /Table Space
	• Managing Users: Create User, Delete User
	• Managing roles:-Grant, Revoke
P12	Study & Implementation of PL/SQL.
P13	Write a PL/SQL program to find the factorial of a given number.
P14	Calculate the net salary and year salary if DA is 30% of Basic, HRA is 10% of Basic and PF is 7% if Basic Salary is less than 8000, PF is 10% if Basic Salary between 8000 to160000.
P15	Study & Implementation of SQL Triggers.
P16	Create a row level trigger for the customers table that would fire for INSERT or UPDATE or DELETE operations performed on the CUSTOMERS table. This trigger will display the salary difference between the old values and new values
P17	Convert employee name into uppercase whenever an employee record is inserted or updated. Trigger to fire before the insert or update.

BCA-3-02P: Data Structures Lab

Total Marks: 50
External Marks: 15
Internal Marks: 35
Credits: 2
Pass Percentage: 40

Course: Data Structures Lab	
Course Code: BCA-3-02P	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Implement basic data structures such as arrays and linked list.
CO2	Develop programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths.
CO3	Implement various searching and sorting algorithms.
CO4	Develop programs to demonstrate the implementation of various operations on stack
CO5	Develop programs to demonstrate the implementation of various operations on queue

Detailed List of Programs:

Program No.	Name of Program
P1	WAP to demonstrate the concept of one dimensional array finding the sum of array elements.
P2	WAP to insert an element in an array
P3	WAP to delete an element from an array.
P4	WAP to insert an element at the beginning of a linked list
P5	WAP to insert an element at the end of a linked list
P6	WAP to insert an element within the linked list
P7	WAP to demonstrate PUSH and POP operations of stack using array
P8	WAP to demonstrate the implementation of queue using linked list
P9	WAP to search an element from an linear array using linear search.
P10	WAP to Search an element using binary search.
P11	WAP to arrange the list of numbers in ascending order using Bubble Sort.
P12	WAP to arrange the list of numbers in ascending order using Insertion Sort.
P13	WAP to arrange the list of numbers in ascending order using Selection Sort.
P14	WAP to arrange the list of numbers in ascending order using Heap Sort.

P15	WAP to arrange the list of numbers in ascending order using Quicksort Sort.
P16	WAP to arrange the list of numbers in ascending order using Merge sort.
P17	WAP to demonstrate the operation of Pre order Traversing technique of Tree
P18	WAP to demonstrate the operation of Post order Traversing technique of Tree
P19	WAP to implement a simple Depth-First Search (DFS) traversal in Graph .
P20	WAP to implement a simple Breadth-First Search (BFS) traversal in Graph.

BCA

SEMESTER III

BCA-3-VEC-3: DRUG ABUSE: PROBLEM, PREVENTION AND MANAGEMENT

Maximum Marks: 100
External Marks: 70
Internal Marks: 30
Credits:02
Pass Percentage: 40%

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

1. The syllabus prescribed should be strictly adhered to.
2. The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short q questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course: Drug Abuse: Problem, Prevention and Management
Course Code: BCA-3-VEC-3

Course Outcomes (COs)
After the completion of this course, the students will be able to:

CO1	Gain a comprehensive understanding of the nature and scope of drug abuse, including the factors contributing to it and its impact on individuals and society.
CO2	Learn about various strategies and interventions aimed at preventing drug abuse, both at the individual and community levels
CO3	Develop skills in managing and treating drug abuse, including understanding different treatment approaches, such as behavioral therapies and medication-assisted treatments.
CO4	Gain an understanding of the legal and ethical issues related to drug abuse, including laws and regulations governing drug use and treatment.
CO5	Develop the ability to assess and evaluate drug abuse problems, interventions, and prevention programs to determine their effectiveness.

Section- A

Unit I- Introduction to the Problem: Concept (what constitutes drug abuse); Nature (vulnerable age groups, signs and symptoms); Causes (physiological, psychological, sociological); Consequences (for individuals, families, society and nations)

Unit II- Management of Drug Abuse: Medical Management (Medication for treatment and to

reduce withdrawal effects, Drug De-addiction clinics, Relapse management); Psycho-Social Management (Counselling, family and group therapy, behavioral and cognitive therapy, Environmental Intervention).

Section- B

Unit I- Social Efforts for Prevention of Drug Abuse: Role of Family and Social Institutions (Parent child relationship, Family support, Supervision, Shaping values, Active Scrutiny; School Counselling, Teacher as role-model. Parent- Teacher-Health Professional Coordination, Random testing on students; Media: Restraint on advertisements of drugs, advertisements on bad effects of drugs, Publicity and media, Campaigns against drug abuse, Educational and awareness program

Unit II- Political Efforts for Prevention of Drug Abuse: NDPS Act, Statutory warnings, Policing of Borders, Checking Supply/Smuggling of Drugs, Strict enforcement of laws, Time bound trials.

Books:

1. Inciardi, J.A. 1981. The Drug Crime Connection. Beverly Hills: Sage Publications.
2. Modi, Ishwar and Modi, Shalini (1997) Drugs: Addiction and Prevention, Jaipur: Rawat Publication.
3. Sain, Bhim 1991, Drug Addiction Alcoholism, Smoking obscenity New Delhi: Mittal Publications.
4. Sandhu, Ranvinder Singh, 2009, Drug Addiction in Punjab: A Sociological Study. Amritsar: Guru Nanak Dev University.
5. Singh, Chandra Paul 2000. Alcohol and Dependence among Industrial Workers: Delhi: Shipra.
6. World Drug Report 2011, United Nations office of Drug and Crime. 8. World Drug Report 2010, United Nations office of Drug and Crime.
7. The Narcotic Drug and Psychotropic Substances Act, 1985, Universal, Delhi, 2012.

28/01/25

Semester-IV

28/01/25

BCA-4-01T: Software Engineering

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 6
Pass Percentage: 40%

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

1. The syllabus prescribed should be strictly adhered to.
2. The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short q questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course: Software Engineering	
Course Code: BCA-4-01T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Understand the software development life cycle which increases the growth opportunity.
CO2	Learn the detail knowledge of software requirement analysis.
CO3	Understands the detailed knowledge of software design and coding.
CO4	Understand the software testing that is relevant to the industry.
CO5	Acquire the detail knowledge of the fundamentals, including terminology; the nature and need for maintenance; maintenance costs and software evolution

SECTION-A

Unit I: Introduction of Software Engineering: The Problem Domain, Software Engineering, Challenges, Software Engineering Approach. Software development life cycle and its phases, Software development process models: Waterfall, Prototyping, Iterative.

Unit II: Software Process: Characteristics of software process, Project management process, Software configuration management process.

Unit III: Project Planning: Activities, COCOMO model. Software Metrics – Definition, Importance, Categories of metrics. Software Quality – Attributes, Cyclomatic complexity metric.

Unit IV: Software Requirements Analysis: Need for SRS, Data flow diagrams, Data Dictionary, entity relationship diagram, Characteristics and components of SRS, validation, metrics.

SECTION-B

Unit V: Software Design: Design principles, Module-level concepts, Structure Chart and Structured Design methodology, verification, metrics: network metrics, information flow metrics.

Unit VI: Coding: Programming Principles and Guidelines, Verification- code inspections, static analysis.

Unit VII: Software Testing: Testing fundamentals, Black Box Testing: Equivalence class partitioning, Boundary value analysis, cause-effect graphing; White Box Testing: Control flow and Data flow based testing, mutation testing; levels of testing, test plan, test case specification, test case execution and analysis.

Unit VIII: Software Maintenance: Categories of maintenance. Software Reliability – Definition, uses of reliability studies

Reference Books:
- Pankaj Jalote, "An Integrated approach to Software Engineering", 3rd Edition 2005, Narosa Publications.

- K.K. Aggarwal, Yogesh Singh, "Software Engineering", Revised 2nd Edition, New Age International Publishers.

- Roger. S. Pressman, "Software Engineering – A Practitioner's Approach", 5th Edition, Tata McGraw Hill.

BCA-4-02T: Computer Networks

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 4
Pass Percentage: 40%

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

1. The syllabus prescribed should be strictly adhered to.
2. The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short q questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course: Computer Networks	
Course Code: BCA-4-02T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Build an understanding of the fundamental concepts of computer networking.
CO2	Identify the different types of network topologies and protocols.
CO3	Understand the concept of networking models, protocols, functionality of each layer
CO4	Identify the function of a firewall, and how it keeps a computer secure and safe from viruses.
CO5	Understand the concept of Firewalls for Network Security.

SECTION-A

Unit I: Basic Concepts: Components of data communication, modes of communication, standards and organizations, Network Classification, Network Topologies; Transmission media, network protocol; layered network architecture.

Unit II: Models: Overview of OSI reference model; TCP/IP protocol suite. Physical Layer: Cabling, Network Interface Card, Transmission Media Devices- Repeater, Hub, Bridge, Switch, Router, Gateway; Transmission impairments.

Unit III: Data Link Layer: Framing techniques; Error Control; Flow Control Protocols; Shared media protocols - CSMA/CD and CSMA/CA.

Unit IV: Network Layer: Virtual Circuits and Datagram approach, IP addressing methods - Sub netting; Routing Algorithms (adaptive and non-adaptive)

SECTION-B

Unit V: Transport Layer: Elements of transport protocols – Addressing, Connection establishment and release, Flow control and buffering, Transport services, Transport Layer protocol of TCP and UDP.

Unit VI: Session and Presentation Layer: Session Layer – Design issues, remote procedure call. Presentation Layer – Design issues, Data compression techniques, Cryptography.

Unit VII: Application Layer: Application layer protocols and services – Domain name system, HTTP, E-mail, WWW, telnet, FTP, SMTP.

Unit VIII: Network Security: Common Terms, Firewalls, Virtual Private Networks

Reference Books:
- B.A. Forouzan, "Data Communication and Networking", 4th Edition, Tata McGraw Hill, 2017.
- A. S. Tanenbaum, "Computer Networks", 5th Edition, Pearson, 2011
- D.E. Comer, "Internetworking with TCP/IP", Vol. I, Prentice Hall of India, 2015
- W. Stalling, Data & Computer Communication, 8th edition, Prentice Hall of India, 2013
- D. Bertsekas, R. Gallager, Data Networks, 2nd edition, Prentice Hall of India. 1992.

BCA-4-03T: Object Oriented Programming

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 4
Pass Percentage: 40%

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

1. The syllabus prescribed should be strictly adhered to.
2. The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been
   · crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.
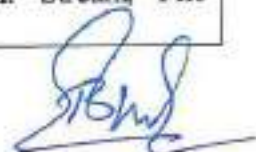
INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course: Object Oriented Programming	
Course Code: BCA-4-03T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Develop understanding of writing object-oriented programs that combine functions and data.
CO2	Gain a thorough understanding of the core principles of OOP, including encapsulation, inheritance, and polymorphism.
CO3	Learn how to apply OOP concepts to solve programming problems, design software systems, and develop reusable code.
CO4	Understand how to create classes and objects in a programming language that supports OOP
CO5	Learn how to use inheritance to create hierarchies of classes and reuse code efficiently.

Detailed Contents:

Module	Module Name	Module Contents
	Section-A	
Module I	Introduction to OOP	**Introduction to OOP:** • Basic concepts (objects, classes, inheritance, polymorphism, encapsulation) • Advantages of OOP over procedural programming **Classes and Objects:** • Declaring classes • Creating objects • Access specifiers (public, private, protected) • Constructors and destructors • Static members
Module II	Inheritance and Polymorphism	**Inheritance:** • Base and derived classes • Types of inheritance (single, multiple, multilevel, hierarchical) • Access control in inheritance **Polymorphism:** • Function overloading • Operator overloading • Virtual functions and runtime polymorphism • Abstract classes and pure virtual functions
	Section-B	
Module III	Encapsulation and Interfaces and Abstract Classes	**Encapsulation:** • Data hiding • Accessor and mutator methods • Benefits of encapsulation **Interfaces and Abstract Classes:** • Declaring interfaces • Implementing interfaces • Abstract classes and methods
Module IV	Exception Handling and File Handling	**Exception Handling:** • Handling exceptions using try-catch blocks • Throwing exceptions • Custom exceptions **File Handling:** • Reading from and writing to files • File streams (File Input Stream, File Output Stream, etc.)

Reference Books:

- Herbert Schildt, "The Complete Reference C++", Tata McGraw-Hill.
- Deiteland Deitel, "C++ How to Program", Pearson Education.
- Robert Lafore, "Object Oriented Programming in C++", Galgotia Publications.
- Bjarne Strautrup, "The C++ Programming Language", Addition-Wesley Publication Co.
- Stanley B. Lippman, Josee Lajoie, "C++ Primer", Pearson Education.
- E. Balagurusamy, "Object Oriented Programming with C++", Tata McGraw-Hill

BCA-4-04T: Computer Graphics

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

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2. The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course: Computer Graphics	
Course Code: BCA-4-04T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Understand the basics of computer graphics, different graphics systems and applications of computer graphics.
CO2	Demonstrate proficiency in 2D graphics programming, including concepts like 2D transformations.
CO3	Analyze and implement key computer graphics algorithms, such as line drawing algorithms, polygon filling algorithms, and clipping algorithms.
CO4	Extract scene with different clipping methods and its transformation to graphics display device.
CO5	Explore projections and visible surface detection techniques for display of 3D scene on 2D screen.

Detailed Contents:

Module	Module Name	Module Contents
Module 1	Introduction to Computer Graphics	Applications areas, Components of Interactive Computer Graphics System. Video Display Devices: Refresh cathode ray tube systems – raster scan CRT displays, random scan CRT displays, colour CRT-monitors, direct view storage tube. Flat panel displays – emissive vs non emissive displays, LCD displays, plasma panel displays, 3-D viewing devices, virtual reality.
Module II	Scan conversion and 2D Graphics	Scan converting a Point, Line (Direct, DDA and Bresenham line algorithms), Circle (Direct, Polar, Bresenham and Mid-point circle algorithms), Ellipse (Direct, Polar and Midpoint ellipse algorithms), Area filling techniques (Boundary fill, Flood fill, scan line area fill algorithm), Limitations of scan conversion. 2D Cartesian and Homogeneous co-ordinate system, Geometric transformations (Translation, Scaling, Rotation, Reflection and Shearing), Composite transformations, 2D dimensional viewing transformation and clipping (Cohen –Sutherland, Liang-Barsky, Sutherland-Hodge man algorithms).
Module III	3D Graphics	3D Cartesian and Homogeneous co-ordinate system, Geometric transformations (Translation, Scaling, Rotation, Reflection), Composite transformations. Mathematics of Projections: Perspective Projections - Mathematical Description and Anomalies of perspective projections. Parallel Projections – Taxonomy of Parallel Projections and their Mathematical Description. Introduction to 3D viewing pipeline and 3D clipping.
Module IV	Hidden surface elimination algorithms	Z-buffer, scan-line, sub-division, Painter's algorithm. Illumination Models: Diffuse reflection, Specular reflection, refracted light, texture surface patterns, Halftoning, Dithering. Surface Rendering Methods: Constant Intensity method, Gouraud Shading, Phong Shading.

Books

1.	R.A. Plastock and G. Kalley, "Computer Graphics", McGraw Hill.
2.	Donald Hearn and M. Pauline Baker, "Computer Graphics", Pearson Education.

3. J.D. Foley, A.V. Dam, S.K. Feiner, J.F. Hughes,. R.L Phillips, "Introduction to Computer Graphics", Addison Wesley Publishing.

BCA-4-03P: Object Oriented Programming Lab

Course: Object Oriented Programming Lab	
Course Code: BCA-4-03P	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Develop the ability to apply OOP fundamentals in creating well-structured and readable code.
CO2	Develop Programs for file handling.
CO3	Develop Programs for Operator Overloading.
CO4	Gain practical experience in implementing OOP concepts such as classes, objects, inheritance, and polymorphism in programming assignments.
CO4	Gain proficiency in using programming languages that support OOP to develop applications and solve real-world problems.

Detailed List of Programs:

Programme No.	Name of Program
P1	Create a class with attributes and methods, and then create objects of that class to demonstrate basic OOP principles.
P2	Create a base class and one or more derived classes to demonstrate inheritance and the use of base class members in derived classes.
P3	Create a base class with a virtual function, override the function in a derived class, and demonstrate runtime polymorphism by calling the function through base class pointers.
P4	Create a class with private data members and public member functions to demonstrate encapsulation and data hiding.
P5	Create a class with a constructor and destructor to demonstrate object initialization and cleanup.
P6	Overload arithmetic or comparison operators for a class to demonstrate operator overloading.

P7	Create a class with multiple functions of the same name but different parameters to demonstrate function overloading.
P8	Create an abstract class with one or more pure virtual functions to demonstrate abstract classes and interfaces.
P9	Create a program that allows the user to add, delete, modify, and display student records. Use file handling to store and retrieve student data.

Students/Learners can implement Object Oriented Programming (OOP) concepts using any language like C++ or Java or Python

BCA-4-04P: Computer Graphics Lab

Total Marks: 50
External Marks: 35
Internal Marks: 15
Credits: 2
Pass Percentage: 40%

Course: Computer Graphics Lab	
Course Code: BCA-4-04P	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Implement the basic concepts of computer graphics.
CO2	Design & Implement scan conversion problems using Python Programming
CO3	Apply clipping and filling techniques for modifying an object.
CO4	Understand the concepts of different type of geometric transformation of objects in 2D and 3D.
CO5	Understand the practical implementation of modeling, rendering, viewing of objects in 2D.

Detailed List of Programs:

Program No.	Name of Program
P1	Write a program to draw basic geometric shapes (lines, circles, rectangles) using a graphics library.
P2	Implement a program that allows the user to interactively draw and manipulate shapes on a canvas.
P3	WAP that demonstrates 2D transformations (translation, rotation, scaling) on a set of objects.
P4	Extend the program to include 3D transformations and demonstrate their effects.
P5	Implement line-drawing algorithms.
P6	Implement circle-drawing algorithms.
P7	Develop a program for polygon filling using scanline or other suitable algorithms.
P8	Create a program that renders objects with different shading models.
P9	Explore the impact of lighting models on the visual appearance of 3D

	objects in a scene.	
P10	Implement texture mapping on a 3D model, and observe the changes in the rendered output.	

Semester-V

28/01/25

BCA-5-01T: Introduction to Cyber Security

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 4
Pass Percentage: 40%

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4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course: Introduction to Cyber Security	
Course Code: BCA-5-01T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Understand network security threats, security services, and countermeasures.
CO2	Understand principles of network security by monitoring and analyzing the nature of attacks through cyber/computer forensics software/tools.
CO3	Develop cyber security strategies and policies
CO4	Measure the performance and troubleshoot cyber security systems.
CO5	Understand various Cryptographic Techniques

Detailed Contents:

Module No.	Module Name	Module Contents
	Section-A	

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Module I	Cyber Attacks and Security	Cyber Attacks: Introduction, Types. Assets: Identification, Accountability. Vulnerability and Threats, Risk Management, Qualitative Risk Assessment, Information Security Framework: Introduction, Policies, Standards, Baselines, Guidelines and Procedures. **Security:** Basics, User Access Controls, Authentication, Access Control: Framework, Techniques and Technologies, Training and Awareness and Its types, Technical Security Controls: Preventive, Detective, Corrective. Protection form malicious attacks.
Module II	Networks and Communication & Software Engineering Life Cycle::	**Networks and Communication:** Data Communication, Characteristics and components, Data flow. Computer Network, Categories, Protocol, External Services, Cloud Computing: Introduction, Models, Benefits, Challenges, Private, Public Clouds. **Software Engineering Life Cycle:** Stages, Models: Waterfall, Iterative, Spiral, V Model, Big Bang, Agile, RAD, Prototype.
	Section-B	
Module III	Authentication	**Authentication:** Authentication Vs Authorization, Methods and Protocols: Kerberos, SSL, Protocol, Password Authentication, Challenge-Handshake Authentication (CHAP), MSCHAP, Extensible Authentication, Remote Authentication. **Service Set Identification (SSID), Encryption Methods:** Wire Equivalent Privacy, WPA, WPA2, MAC Filtering, Wireless Routers, Creating Wireless Network, WLAN.
Module IV	Investigation Techniques & Cyber Forensics and Cryptography:	**Investigation Techniques and Cyber Forensics:** Types of Investigation, Evidence and Analysis, Steps for Forensics Investigation, Forensics Tools, Investigation, Common Types of Email Abuse, Tracking Location of Email Sender, Scam or Hoax Emails and Websites, Fake Social Media Profile. **Cryptography:** Objectives, Type, OS Encryption, Public key Cryptography.

Books

1. Mayank Bhushan, Rajkumar Singh Rathore, Aatif Jamshed, "Fundamentals of Cyber Security", BPB Publications.

2. Nina Godbole, SModule Belapure, "Cyber Security", Wiley.

3. Sanil Nadkarni, "Fundamentals of Information Security", pbp.

4. Mike Chapple, James Michael Stewart, Darril Gibson, "CISSP Certified Information Systems Security Professional Official Study Guide" 9th Ed., SYBEX, A Wiley Brand.

5. William Chuck Eastton, "Computer Security Fundamentals", 4th Edition, Pearson.

BCA-5-01P: Introduction to Cyber Security Lab

Total Marks: 50
External Marks: 35
Internal Marks: 15
Credits: 2
Pass Percentage: 40%

Course Name: Introduction to Cyber Security Lab
Course Code: BCA-5-01P
Course Outcomes (COs)
After the completion of this course, the students will be able to:

CO 1	Identify and analyze common cyber threats, including malware, phishing attacks, and network vulnerabilities.
CO 2	Apply techniques to detect, mitigate, and respond to various types of cyber threats.
CO 3	Implement security configurations for operating systems, network devices, and applications.
CO 4	Apply ethical hacking techniques to identify and exploit vulnerabilities in controlled environments, emphasizing responsible and legal practices.
CO5	Implement cryptographic techniques for security purpose

Detailed Contents:

S. No.	Name of Experiments
1	How to identify open ports, services, and potential vulnerabilities on target systems.
2	How to scan and enumerate devices on a network using Nmap tool.
3	How to analyse the malware in a controlled environment.
4	Conduct an experiment for phishing simulation to demonstrate common phishing tactics.
5	How to configure a firewall to control incoming and outgoing network traffic.
6	Design and implement the rules to permit or deny specific types of traffic.
7	Design and implement the secure communication using tools like OpenSSL or GPG.
8	Simulate various common password cracking techniques.
9	Study of Computer Forensics and different tools used for forensic investigation

10	How to encrypt and decrypt messages using the chosen algorithm and analyze the security properties.

Elective Courses

BCA-5-02T-EC-A1: Introduction to Artificial Intelligence

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 6
Pass Percentage: 40%

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

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2. The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
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4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

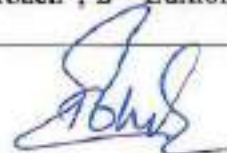| Course: Introduction to Artificial Intelligence	
Course Code: BCA-5-02T-EC-A1	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Explain the basic concepts, principles, and techniques of artificial intelligence.
CO2	Explore real-world applications of AI in various domains such as healthcare, finance, and robotics.
CO3	Develop the ability to identify and formulate problems that can be solved using AI techniques.
CO4	Apply AI solutions to address real-world challenges.
CO5	Describe the basic concepts, principles, and techniques for the development of expert systems

Detailed Contents:

Module	Module Name	Module Contents
Section-A		
Module I	Introduction to Artificial Intelligence	Definitions of AI, Intelligent Agents, Problem solving. Knowledge, Reasoning and Planning: Logical Agents, Classical Planning, Knowledge Representation and Reasoning. Learning: Learning from examples, Knowledge in learning.
Module II	Communicating, Perceiving and Acting	Communication, Natural Language Processing, Perception, Computer Vision, Robotics.
Module III	Searching	Searching for solutions, uniformed search strategies: Breadth first search, depth first Search. Search with partial information (Heuristic search) Hill climbing, A*, AO* Algorithms
Section-B		
Module IV	Expert Systems	Introduction, basic concepts, structure of expert systems, the human element in expert systems how expert systems works, problem areas addressed by expert systems, expert systems success factors, types of expert systems, knowledge engineering, scope of knowledge, difficulties, in knowledge acquisition methods of knowledge acquisition, machine learning, intelligent agents, selecting an appropriate knowledge acquisition method, societal impacts reasoning in artificial intelligence, inference with rules, with frames: model based reasoning, case based reasoning, explanation & meta knowledge inference with uncertainty representing uncertainty.
Module V	AI Applications (General)	Speech Recognition, Image Recognition, Natural Language Processing, Autonomous Transportation. Natural Language understanding, Recognizing objects and describing images, Dimensionality reduction, feature selection and feature extraction.
Module VI	AI Applications (Specific)	Virtual Personal Assistants/ Chatbots, Gaming, Smart Cars, Drones, Fraud Detection, Software Testing and Development, Business, Health Care, Education, Finance.

Books

1. S. Russel and P. Norvig, "Artificial Intelligence – A Modern Approach", 2nd Edition, Pearson Education.

2. David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence: a logical approach", Oxford University Press.
3. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", 4th Edition, Pearson Education.
4. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers.

BCA-5-02T-EC-A2: Cyber Laws

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 6
Pass Percentage:40%

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

1. The syllabus prescribed should be strictly adhered to.
2. The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
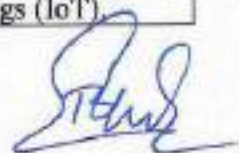
Course Name: Cyber Laws	
Course Code: BCA-5-02T-EC-A2	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO 1	Understand various types of cyber crimes
CO 2	Understand Indian Laws to deal with Cyber Crimes and its critical analysis
CO 3	Understand Legal Recognition of Electronic Records and Electronic Evidence
CO 4	Examine and interpret laws related to cybercrimes, including hacking, identity theft, and online fraud.
CO 5	Explore the legal aspects of intellectual property rights, including copyright, patents, and trademarks, in the digital environment.

Detailed Contents:

Module No.	Module Name	Module Contents
		Section-A
Module I	Introduction to Cyber Crimes	Cybercrimes and related offences and penalties: Introduction to Cybercrimes, Classification of cybercrimes, Distinction between cybercrime and

		conventional crimes, Reasons for commission of cybercrime, Kinds of cybercrimes – cyber stalking; cyber pornography; forgery and fraud; crime related to IPRs; Cyber terrorism; Spamming, Phishing, Privacy and National Security in Cyberspace, Cyber Defamation and hate speech, computer vandalism etc.
Module II	Indian Cyber Laws	Provisions in Indian Laws in dealing with Cyber Crimes and its critical analysis, Information Technology Act, 2000, Penalties under IT Act, Offences under IT Act, Offences and Analysis related with Digital Signature and Electronic Signature under IT Act, Statutory Provisions, Establishment of Authorities under IT Act and their functions, powers. Cybercrimes under IPC
Module III	Electronic Governance	Legal Recognition of Electronic Records and Electronic Evidence -Digital Signature Certificates - Securing Electronic records and secure digital signatures - Duties of Subscribers - Role of Certifying Authorities - Regulators under the IT Act -The Cyber Regulations Appellate Tribunal - Internet Service Providers and their Liability– Powers of Police under the IT Act – Impact of the IT Act on other Laws.
Section-B		
Module IV	Cr. P. C and Indian Evidence Act	Cybercrimes under the Information Technology Act, 2000 - Cybercrimes under International Law - Hacking Child Pornography, Cyber Stalking, Denial of service Attack, Virus Dissemination, Software Piracy, Internet Relay Chat (IRC) Crime, Credit Card Fraud, Net Extortion, Phishing etc - Cyber Terrorism Violation of Privacy on Internet - Data Protection and Privacy – Indian Court cases
Module V	Intellectual Property Rights	Copyrights – Software – Copyrights vs Patents debate - Authorship and Assignment Issues - Copyright in Internet - Multimedia and Copyright issues - Software Piracy - Trademarks - Trademarks in Internet – Copyright and Trademark cases
Module VI	International Cooperation and Emerging Legal Issues	Examination of international frameworks and agreements related to cybersecurity. Analysis of the challenges and legal considerations associated with cross-border cyber threats. Exploration of emerging legal issues in cybersecurity, including artificial intelligence, blockchain, and the Internet of Things (IoT).

Books

1. "The Information Technology Act, 2000 Bare Act with Short Notes", Universal Law Publishing Co., New Delhi

2. Justice Yatindra Singh, "Cyber Laws", Universal Law Publishing Co., New Delhi

3. Farouq Ahmed, "Cyber Law in India", New Era publications, New Delhi

4. S. R. Myneni, "Information Technology Law (Cyber Laws)", Asia Law House, Hyderabad.

5. Chris Reed, "Internet Law-Text and Materials", Cambridge University Press.

6. Pawan Duggal, "Cyber Law- the Indian Perspective", Universal Law Publishing Co., New Delhi.

7. Elias. M. Awad, "Electronic Commerce", Prentice-Hall of India Pvt. Ltd

BCA-5-02T-EC-A3: Introduction Mobile Architecture

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 6
Pass Percentage: 40%

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

1. The syllabus prescribed should be strictly adhered to.
2. The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course: Introduction Mobile Architecture	
Course Code: BCA-5-02T-EC-A3	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Gain a foundational understanding of major mobile platforms (iOS, Android) and their architecture, including the key components and frameworks that enable mobile application development.
CO2	Learn the fundamental principles of designing mobile applications, considering factors such as user interface (UI), user experience (UX), and responsiveness across different devices.
CO3	Acquire knowledge of cross-platform development frameworks (e.g., React Native, Flutter) and understand how to create mobile applications that can run on multiple platforms with a single codebase.
CO4	Develop an awareness of mobile security concerns and best practices, including data encryption, secure authentication, and protection against common mobile app vulnerabilities.

CO5	Learn how mobile applications interact with backend services, including the use of APIs (Application Programming Interfaces) and understanding the role of backend architecture in supporting mobile functionality.

Detailed Contents:

Module	Module Name	Module Contents
Section-A		
Module I	Introduction to Mobile App	Introduction to Mobile App, Objectives of Mobile App, Considerations and Challenges for Mobile App, PC Based Applications, Web Based Applications, Evolution of Mobile Based Apps, Comparison of Mobile App with Web Application, Content and Protocol in Mobility, Trends in Mobility Space, Mobile App Platforms
Module II	Components of a Mobile Application	Components of a Mobile Application: Architecture of a Mobile Application, Architecture of a native Mobile App, Architecture of a hybrid Mobile App, Architecture of a Mobile Web App, Components of a Mobile Client Application, Components of Mobile Support Infrastructure, End to End Case Study of Android Mobile Architecture, Basics of Mobile Application Design: Design Considerations, User Interface Design for Mobile Apps, Deployment, Power Usage, Synchronization, Patterns and Design Elements, Security Standards and Best Practices, Mobile App Testing
Module III	Introduction to Mobile Operating Systems	Introduction to Mobile Operating Systems: Basic Functions of an Operating System, Mobile Operating Systems: Layer 0, Layer 1, Layer 2, Architecture of Android, Knowing the Operating System of a Mobile Phone, Discontinued Mobile Operating Systems, Existing Mobile Operating Systems, Types of Mobile Operating Systems, Basics of Android: Objectives, Interface, Applications, Memory Management, Virtual Reality
Section-B		
Module IV	Basics of iOS	Basics of iOS: Objectives , Accessibility, Multitasking, Siri, Setting up Siri, Launching Siri , Game Center, Basics of Windows Mobile: Evolution of Windows Phone, Features of Windows Phone, Virtual Private Networking, Windows Phone 7, Windows Phone , Windows 10 Mobile
Module V	Mobile Processors	Mobile Processors, ARM Processors, Features of ARM processor, ARM architecture, x86 Processors, Basic Design of x86 Processor, Instruction Execution Cycle, Differences Between x86 and

		ARM Processors, Memory in a Mobile Phone: Volatile Memory, Non-Volatile Memory, Memory Card, ROM, Flash Memory, Differences between NOR and NAND flash memories
Module VI	**Sensors**	Sensors: Gyroscope, Accelerometer, Types of Accelerometer, Specification of an Accelerometer, Output of an Accelerometer, Applications of an Accelerometer, Compass, Proximity Sensor, Input-Output: Display, Camera, Speakers, Active Speakers, Passive Speakers, Microphones, Types of Microphones, Native Development Tools: Native Development Tools: Development Tools for Android, Android Studio, Eclipse IDE, Development Tools for iOS, Xcode, Swift, Development Tools for Windows Based Mobiles, C#, XAML

Books

1. Brian Fling "Mobile Design and Development: Practical concepts and techniques for creating mobile sites and web apps", O'Reilly
2. Jim O'Donnell "Mobile Architecture: Patterns and Components for Enterprise Mobile Applications"
3. David Thiel and Rich Mogull "iOS Application Security: The Definitive Guide for Hackers and Developers"
4. Bill Phillips and Chris Stewart "Android Programming: The Big Nerd Ranch Guide", Big Nerd Ranch Guides
5. Nader Dabit "React Native in Action", Manning

BCA-5-03T-EC-B1: Machine Learning

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 4
Pass Percentage: 40%

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

1. The syllabus prescribed should be strictly adhered to.
2. The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course: Machine Learning	
Course Code: BCA-5-03T-EC-B1	
Course Outcomes (COs)	
After the completion of this course, the students will be able to:	
CO1	Understand the fundamental concepts and principles of machine learning.
CO2	Apply and evaluate various supervised learning algorithms
CO3	Explore and apply unsupervised learning techniques
CO4	Apply machine learning techniques to solve real-world problems
CO5	Evaluate the strengths and limitations of different machine learning approaches

Detailed Contents:

Module	Module Name	Module Contents
Section-A		
Module I	**Introduction to Machine Learning**	Introduction to ML, Applications of Machine learning, machine learning as a future; Data Pre-processing: Importing the libraries, Importing the

		dataset, taking care of missing data, encoding categorical data, Splitting the dataset into training set and test set, Feature scaling.
		Simple linear regression, Multiple linear regression, Logistic Regression, K-Nearest Neighbors, Support vector machine, Decision tree classification, Random forest classification, k-means clustering
Module II	**Introduction to Artificial Neural Networks**	Introduction to ANNs, Biological Neural Networks; Usefulness and Applications of ANNs; Architectures of ANNs: Single layer, Multilayer, Competitive layer; Learning: Supervised and Unsupervised; Activation functions; Linear and Non-linear Separability
	Section-B	
Module III	**Supervised Models**	**Hebb Net:** introduction, algorithm, application for AND problem; **Perceptron:** architecture, algorithm, application for OR Problem; **ADALINE:** architecture, algorithm, application for XOR problem; **MADALINE:** architecture, algorithm, application for XOR problem; **Back propagation Neural Network:** architecture, parameters, algorithm, applications, different issues regarding convergence
Module IV	**Unsupervised Models**	**Kohonen Self –Organizing Maps:** architecture, algorithm, application, **Adaptive Resonance Theory:** introduction, basic architecture, basic operation, ART1 and ART

Books

1. Andreas C. Müller, "Introduction to Machine Learning with Python: A Guide for Data Scientists", Sarah Guido, 2016
2. E. Alpaydin, "Introduction to Machine Learning", 3rd Edition, PHI Learning, 2015
3. K. P. Murphy, "Machine Learning:A Probabilistic Perspective", MIT Press, 2012
4. https://www.udemy.com/course/machinelearning

BCA-5-03P-EC-B1: Machine Learning Lab

Total Marks: 50
External Marks: 35
Internal Marks: 15
Credits: 2
Pass Percentage: 40%

Course: Machine Learning Lab	
Course Code: BCA-5-03P-EC-B1	
Course Outcomes (COs)	
After the completion of this course, the students will be able to:	
CO1	Apply a perceptron to solve binary classification problems.
CO2	Apply ADALINE and MADALINE to solve binary classification problems.
CO3	Write code to implement the backpropagation algorithm from scratch.
CO4	Implement and experiment with different clustering algorithms.
CO5	Work with real-world datasets to apply machine learning algorithms or training neural networks.

Detailed List of Programs:

Program No.	Name of Program
P1	Extract the data from database using python
P2	Implementation of Linear Regression
P3	Implementation of Logistic regression
P4	Implementation of Decision tree classification
P5	Implementation of K-nearest Neighbor
P6	Implement the Perceptron Learning rule works for OR Gate training.
P7	Implement the ADALINE works for AND Gate training.
P8	Implement the MADALINE works for XOR Gate training
P9	Build Artificial Neural Network model with back propagation
P10	Implementing K-means Clustering
P11	Implementation of Unsupervised Learning Algorithm ART1
P12	Implementation of Unsupervised Learning Algorithm ART2

BCA-5-03T-EC-B2: Digital Forensics

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 4
Pass Percentage:40%

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

1. The syllabus prescribed should be strictly adhered to.
2. The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course Name: Digital Forensics	
Course Code: BCA-5-03T-EC-B2	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO 1	Understand the principles and concepts of digital forensics.
CO 2	Understand various types of cyber crimes
CO 3	Analyze computer architectures, file systems, and operating systems relevant to digital forensics investigations.
CO 4	Understand the legal and ethical considerations associated with digital forensics, including the admissibility of digital evidence in court.
CO 5	Utilize popular forensic tools and software for digital investigations.

Detailed Contents:

Module No.	Module Name	Module Contents
Section-A	
Module I	**Introduction to Digital Forensics and Cyber Crime**	• Introduction to digital forensics, definition and scope of digital forensics • Different Branches of Digital Forensics • Importance and applications of digital forensics in law enforcement and cybersecurity. • Definition and types of cybercrimes • Electronic evidence and handling, electronic media, collection, searching and storage of electronic media, • Introduction to internet crimes • Hacking and cracking, credit card and ATM frauds, web technology, cryptography, emerging digital crimes and modules
Module II	**Legal aspects of Digital Forensics**	• Understanding of legal aspects and their impact on digital forensics, Electronics discovery • Overview of legal and ethical issues in digital forensics. • Types of digital evidence (e.g., documents, emails, logs). • Collection, preservation, and documentation of digital evidence. • Preparing forensic reports. • Providing expert testimony in court. • Admissibility of digital evidence in court.
Section-B	
Module III	**Forensic Tools**	• Introduction to Forensic Tools • Usage of Slack space • Tools for Disk Imaging, Data Recovery, Vulnerability • Assessment Tools, Encase and FTK tools • Anti-Forensics and probable counters • Retrieving information
Module VI	**Processing of Electronic Evidence**	• Process of computer forensics and digital investigations • Processing of digital evidence, digital images, damaged SIM and data recovery, multimedia evidence • Retrieving deleted data: desktops, laptops and mobiles

		- Retrieving data from slack space, renamed file, ghosting, compressed files - Techniques for analysing and extracting information from computer memory - Forensic analysis of smartphones and tablets.

Books

1. C. Altheide & H. Carvey, "Digital Forensics with Open Source Tools", Syngress
2. John Sammons "The Basics of Digital Forensics", Syngress
3. Brain Carrier "File System Forensic Analysis", Addison-Wesley
4. Harlan Carvey "Advanced Digital Forensic Analysis of the Windows Registry", Syngress
5. Diane Barrett "Virtualization and Forensics - A Digital Forensic Investigator's Guide to Virtual Environments", Syngress
6. B. Nelson, A. Phillips, and C. Steuart "Guide to Computer Forensics and Investigations", Cengage

BCA-5-03P-EC-B2: Digital Forensics Lab

Course Name: Digital Forensics Lab	
Course Code: BCA-5-03P-EC-B2	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO I	Understand the working of computer forensics and different tools used for forensic investigation
CO II	Recover Deleted Files using Forensics Tools
CO III	Utilize popular forensic tools and software for digital investigations.
CO IV	Work collaboratively in a team to conduct digital forensics investigations.
CO V	Compile and organize digital forensics findings into comprehensive reports

Detailed Contents:

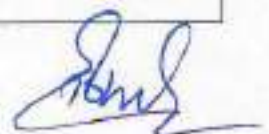| S. No.	Name of Experiment
1	Study of Computer Forensics and different tools used for forensic investigation
2	How to Recover Deleted Files using Forensics Tools
3	Study the steps for hiding and extract any text file behind an image file/Audio file using Command Prompt
4	How to Extract Exchangeable image file format (EXIF) Data from Image Files using ExifReader Software
5	How to make the forensic image of the hard drive using EnCase Forensics
6	To create a forensic image with *FTK* image
7	How to Restoring the Evidence Image using EnCase Forensics
8	How to Extracting Browser Artifacts
9	How to View Last Activity of Your PC
10	Find Last Connected USB on your system (USB Forensics)

BCA-5-03T-EC-B3: Introduction to Android

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

1. The syllabus prescribed should be strictly adhered to.
2. The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course: Introduction to Android	
Course Code: BCA-5-03T-EC-B3	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Gain proficiency in Android app development, understanding the Android Studio development environment, Java or Kotlin programming languages, and the fundamental concepts of building Android applications.
CO2	Develop skills in designing user interfaces (UI) for Android applications, adhering to Android's design principles and guidelines to create visually appealing and user-friendly experiences.
CO3	Understand the process of deploying Android applications on the Google Play Store, including the necessary steps for app submission, review, and updates.
CO4	Learn to integrate and utilize various Android APIs and features, such as location services, camera access, notifications, and other functionalities to enhance the capabilities of Android applications.

CO5	Gain a comprehensive understanding of the Android ecosystem, including the Android OS architecture, application lifecycle, and how apps interact with the underlying system and hardware.

Detailed Contents:

Module	Module Name	Module Contents
Section-A		
Module I	**Introduction to Android**	Introduction to Android: Android as a popular mobile platform, History of Android, Evolution of Android, Features of Android, Comparison of mobile Operating systems, Devices that run Android as the Operating System, Categories of Android applications Android Architecture: Introduction, Android Architecture, Android Architecture, Types of mobile applications, Application Fundamentals
Module II	**Activity lifecycle**	Activity lifecycle: Introduction, what is an Activity in Android? Android Application Fundamentals, what are the Android process states? Android Development Environment: Introduction, Reasons for Android Development, Android Development Platforms, Features and Tools, Configuring Android Development Environment, Setting Up Android Development Environment, Install Android for Windows 10
Section-B		
Module III	**Integrating Multimedia**	Integrating Multimedia: Introduction to Multimedia, Audio and video integration into Android Application Development, Multimedia for Android Interactive Application Development, Camera functions in Android Application Development, Supported Media Formats, Saving Data on Android Devices: Android Storage Options, Shared Preferences, Internal Storage, External Storage, Saving data in SQLite databases
Module IV	**Connectivity and the cloud**	Connectivity and the cloud: Connecting devices wirelessly, performing network operations, Considerations when transferring data, syncing to the cloud with information delivery models, Push Notification, publish to Android Market: How can you obtain an Android Application? App Stores, Revenue Models, Google Play, Process of Publishing an Android Application, Performance Profiling, Android Monitor Overview, Android Monitor Basics, Profiling a Running App in Android Monitor, How Android Manages Memory, Battery Analysis, Optimizing Battery Analysis,

		Security: Security Concerns of an Android Application, Security Provided by the OS, Information Leakage, Device Management Policies

Books

1. Dawn Griffiths and David Griffiths, "Head First Android Development", Shroff/O'Reilly
2. Bill Phillips and Chris Stewart, "Android Programming: The Big Nerd Ranch Guide", Big Nerd Ranch Guides
3. Neil Smyth, "Android Studio 4.0 Development Essentials - Kotlin Edition" , O'Reilly Media
4. Michael Burton and Donn Felker, "Android App Development for Dummies", For Dummies
5. John Horton, "Android Programming for Beginners", Packt Publishing

BCA-5-03P-EC-B3: Introduction to Android Lab

Total Marks: 50
External Marks: 35
Internal Marks: 15
Credits: 2
Pass Percentage: 40%

Course: Introduction to Android Lab	
Course Code: DMAD-1-03P	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Attain proficiency in Android app development by gaining hands-on experience in designing, coding, and debugging basic Android applications using the Android Studio IDE.
CO2	Develop expertise in designing visually appealing and user-friendly Android user interfaces (UI), applying Android's design principles, layouts, and widgets effectively.
CO3	Learn to integrate and utilize various device features such as camera, sensors, and location services in Android applications, demonstrating the ability to create feature-rich and interactive mobile apps.
CO4	Acquire strong debugging and troubleshooting skills in the Android development environment, including the use of debugging tools and techniques to identify and fix common issues in Android applications.
CO5	Understand the process of deploying Android applications on physical devices or emulators, and gain proficiency in testing and validating the functionality of Android apps on different devices and screen sizes.

Detailed List of Programs:

Programme No.	Name of Program
P1	Create a simple Android app that displays "Hello, World!" on the screen.
P2	Develop a calculator app that performs basic arithmetic operations like addition, subtraction, multiplication, and division.
P3	Design an app that calculates and displays the tip amount based on the entered bill and tip percentage.
P4	Build an app that converts temperatures between Celsius and Fahrenheit.
P5	Create a simple to-do list app that allows users to add, edit, and delete tasks.
P6	Develop an app that displays a list of images and allows users to view them in a larger format.

P7	Create a flashlight app that turns the device's flashlight on and off.
P8	Design an app that simulates rolling a six-sided die.
P9	Build a Body Mass Index (BMI) calculator app that takes height and weight inputs and calculates the BMI.
P10	Develop a quiz app with multiple-choice questions and provides feedback on the user's answers.
P11	Create an app that converts currencies based on the latest exchange rates.
P12	Build an app that displays a list of contacts and allows users to view details and make calls.
P13	Develop a basic music player app that allows users to play, pause, and skip tracks.
P14	Implement an app that tracks and displays the user's current location using GPS.
P15	Create an app that allows users to take pictures using the device's camera.
P16	Design a simple chat application that allows communication between two devices via Bluetooth.
P17	Build an alarm clock app that allows users to set alarms and receive notifications.
P18	Implement an app that logs data from device sensors, such as accelerometer or gyroscope.
P19	Create an app that recognizes and responds to different touch gestures, such as swipe or pinch.
P20	Build an app that fetches and displays weather information based on the user's location.

BCA-5-04: Seminar

Total Marks: 50
External Marks: 35
Internal Marks: 15
Credits: 2
Pass Percentage: 40%

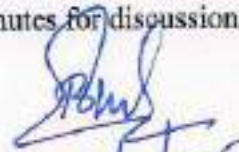| Course: Seminar	
Course Code: BCA-5-04	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Enhance soft skill through oral presentation.
CO2	Gain ability to present literature survey, problem formulation and solution.
CO3	Prepare the proper documentation of software project following the standard guidelines
CO4	Develop technical report writing
CO5	Gain ability of discussion and questions handling.

Description

To select seminar topic in the field of Computer Science & Applications

At the beginning of the 5th semester (deadline 15 March for Jan Admission Cycle and 15 October for July Admission Cycle) every student has to submit his/her application for the seminar to the Course Coordinator for the approval of topic. Within 30 days after approval the topic, the students have to submit their seminar report to their course coordinator.

The length of the seminar report should be about 10-15 A4 pages (about 3000-4500 words).

After the submission of the seminar report, students will present their approved report. The duration of the presentation is 15-20 minutes with an additional 5 minutes for discussions.

28/01/25

Semester-VI

Elective Courses

BCA-6-01T-EC-C1: Data Mining & Visualization

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

1. The syllabus prescribed should be strictly adhered to.
2. The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course: Data Mining & Visualization	
Course Code: BCA-6-01T-EC-C1	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Understand Data Warehouse fundamentals and Data Mining tools.
CO2	Understand Data Mining Techniques
CO3	Apply clustering methods like K means, hierarchical clustering, agglomerative clustering, divisive clustering to solve problems and evaluate clusters
CO4	Gain knowledge related to application areas of data mining
CO5	Understand the components involved in data visualization design.

26/01/28

Detailed Contents:

Module	Module Name	Module Contents
Section-A		
Module I	**Introduction to Data Mining & Data Mining Techniques**	**Data Mining:** Introduction, Scope, of Data Mining, How does Data Mining Works, Predictive Modeling; Data Mining and Data Warehousing; Architecture for Data Mining; Profitable Applications; Data Mining Tools; Data Pre-processing: Overview, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation. **Data Mining Techniques:** An Overview, Data Mining Versus Database Management System, Data Mining Techniques- Association rules, Classification, Regression, Clustering, Neural networks.
Module II	**Clustering**	Clustering: Introduction, Cluster Analysis, Clustering Methods- K means, Hierarchical clustering, Agglomerative clustering, Divisive clustering, evaluating clusters.
Section-B		
Module III	**Applications of Data Mining**	Applications of Data Mining: Introduction, Business Applications Using Data Mining- Risk management and targeted marketing, Customer profiles and feature construction, Medical applications (diabetic screening), Scientific Applications using Data Mining, Other Applications.
Module VI	**Data Visualization & Exploring the Visual Data Spectrum**	Data Visualization: Introduction, Acquiring and Visualizing Data, Simultaneous acquisition and visualization, Applications of Data Visualization, Keys factors of Data Visualization (Control of Presentation, Faster and Better JavaScript processing, Rise of HTML5, Lowering the implementation Bar) Exploring the Visual Data Spectrum: charting Primitives (Data Points, Line Charts, Bar Charts, Pie Charts, Area Charts), Exploring advanced Visualizations (Candlestick Charts, Bubble Charts, Surface Charts, Map Charts, Infographics).

Books

1. Jiawei Han, Micheline Kamber and Jian Pei, "Data Mining Concepts and Techniques", 3rd Edition, 2000
2. Pang-Ning Tan, Michael Steinbach, and Vipin Kumar, "Introduction to Data Mining", Pearson, 2005
3. M. Kantardzic, "Data Mining: Concepts, Models, Methods, and Algorithms", 2nd Edition, Wiley-IEEE Press, 2011
4. Jon Raasch, Graham Murray, Vadim Ogievetsky, Joseph Lowery, "JavaScript and jQuery for Data Analysis and Visualization", 2014
5. Ben Fry, "Visualizing data: Exploring and explaining data with the processing environment", O'Reilly, 2007

BCA-6-01P-EC-C1: Data Mining & Visualization Lab

Total Marks: 50
External Marks: 15
Internal Marks: 35
Credits: 2
Pass Percentage: 40%

Course: Data Mining & Visualization Lab	
Course Code: BCA-6-01P-EC-C1	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Explore WEKA Data Mining/Machine Learning Toolkit.
CO2	Perform data pre-processing tasks and Demonstrate performing association rule mining on data sets.
CO3	Demonstrate the performance of Naïve-Bayes and K-Nearest Neighbor classifiers on data sets.
CO4	Evaluate the performance of Naïve-Bayes and k-Nearest Neighbor classifiers through ROC Curves
CO5	Explore visualization features of Weka to visualize the clusters.

Exp1. Explore WEKA Data Mining/Machine Learning Toolkit

- Downloading and/or installation of WEKA data mining toolkit,

- Understand the features of WEKA toolkit such as Explorer, Knowledge Flow interface,

- Experimenter, command-line interface.

- Navigate the options available in the WEKA (ex. Select attributes panel, Preprocess panel, classify panel, Cluster panel, Associate panel and Visualize panel)

- Study the arff file format

- Explore the available data sets in WEKA.

- Load a data set (ex. Weather dataset, Iris dataset, etc.)

- Load each dataset and observe the following:

    - List the attribute names and they types

    - Number of records in each dataset

    - Identify the class attribute (if any)

    - Plot Histogram

    - Determine the number of records for each class.

> ➤ Visualize the data in various dimensions

Exp2. Perform data pre-processing tasks and Demonstrate performing association rule mining on data sets.

Exp3. Demonstrate performing classification on data sets:

- Load each dataset into Weka and run Id3, J48 classification algorithm. Study the classifier output. Compute entropy values, Kappa statistic. Extract if-then rules from the decision tree generated by the classifier, Observe the confusion matrix.

- Load each dataset into Weka and perform Naïve-Bayes classification and k-Nearest Neighbor classification. Interpret the results obtained.

- Plot ROC Curves and Compare classification results of ID3, J48, Naïve-Bayes and k-NN classifiers for each dataset, and deduce which classifier is performing best and poor for each dataset and justify.

Exp4. Demonstrate performing clustering of data sets:

- Load each dataset into Weka and run simple k-means clustering algorithm with different values of k (number of desired clusters). Study the clusters formed. Observe the sum of squared errors and centroids, and derive insights.

- Explore other clustering techniques available in Weka

- Explore visualization features of Weka to visualize the clusters. Derive interesting insights and explain.

BCA-6-01T-EC-C2: Cyber Attacks and Counter Measures

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 4
Pass Percentage: 40%

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

1. The syllabus prescribed should be strictly adhered to.
2. The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course Name: Cyber Attacks and Counter Measures Course Code: BCA-6-01T-EC-C2	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO 1	Understand the importance of a network basics and brief introduction on security of network protocols
CO 2	Demonstrate a solid understanding of foundational cybersecurity concepts, principles, and best practices.
CO 3	Apply risk assessment methodologies to evaluate and prioritize potential vulnerabilities within a given system or network.
CO 4	Design and develop security plans and strategies to ensure the integrity of information in compliance with best practices, relevant policies, standards, and regulations.
CO 5	Evaluate the impact of cybersecurity decisions on privacy, compliance, and organizational reputation, and adhere to ethical standards in the field.

Detailed Contents:

Module No.	Module Name	Module Contents
Section-A	
Module 1	Introduction to Cybersecurity and Threat Landscape	• Overview of Cybersecurity: Fundamental concepts, objectives, and importance. • Cyber Threat Landscape: Types of cyber threats, attack vectors, and motivations. • Current Trends: Analysis of recent cyber threats and emerging trends in the cybersecurity landscape.
Module II	Security Fundamentals and Risk Assessment	• Security Foundations: Principles, protocols, and standards in cybersecurity. • Vulnerability Assessment: Techniques for identifying and assessing vulnerabilities. • Risk Management: Understanding risk, assessing potential impacts, and prioritizing security measures.
Section-B	
Module III	Implementing Security Measures and Incident Response	• Security Controls: Designing and implementing security measures, including firewalls, antivirus, encryption, and access controls. • Incident Response Planning: Developing and implementing an incident response plan. • Security Monitoring: Using tools and techniques to monitor for potential security incidents.
Module IV	Ethical Hacking, Penetration Testing, and Legal Considerations	• Ethical Hacking: Introduction to ethical hacking principles and practices. • Penetration Testing: Conducting controlled attacks to identify and address vulnerabilities. • Legal and Ethical Considerations: Understanding the legal and ethical aspects of cybersecurity, including compliance, privacy, and responsible disclosure.

Books

1. Sammons, John, and Michael Cross, "The basics of cyber safety: computer and mobile device safety made easy", Syngress
2. Charles P. Pfleeger, Shari Lawrence, Pfleeger Jonathan Margulies, "Security in Computing", Pearson
3. Brooks, Charles J., Christopher Grow, Philip Craig, and Donald Short, "Cybersecurity essentials", Sybex

4. William Stallings "Network Security Essentials", Pearson
5. Ross J. Anderson "Security Engineering: A Guide to Building Dependable Distributed Systems", 2nd Ed., John Wiley & Sons

BCA-6-01P-EC-C2: Cyber Attacks and Counter Measures Lab

Total Marks: 50
External Marks: 35
Internal Marks: 15
Credits: 2
Pass Percentage: 40%

Course Name: Cyber Attacks and Counter Measures Lab	
Course Code: BCA-6-01P-EC-C2	
Course Outcomes (COs)	
After the completion of this course, the students will be able to:	
CO 1	Develop skills in configuring security settings for operating systems, networks, and applications.
CO 2	Analyse network traffic using tools like Wireshark.
CO 3	Conduct vulnerability assessments to identify potential weaknesses and recommend appropriate countermeasures.
CO 4	Apply tools to analyze network traffic and system logs in real-time.
CO 5	Understand and apply secure coding practices to develop resilient software.

Detailed Contents:

S. No.	Name of Experiment
1	How to create signatures to detect and block the malware using antivirus or intrusion detection systems.
2	How to capture and analyse network traffic using tools like Wireshark.
3	How to configure and test an intrusion detection system to identify and respond to malicious activities.
4	Implement the firewall rules by simulating different attack scenarios and assessing the effectiveness of the configured rules.
5	Conduct a phishing simulation to test user awareness and susceptibility.
6	Evaluate the effectiveness of implemented countermeasures and educate users on recognizing phishing attempts.
7	Develop and implement a patch management plan to address identified vulnerabilities.
8	Simulate a cybersecurity incident and implement an incident response plan.

9	Perform security testing on a web application to identify and remediate common vulnerabilities.
10	How to implement countermeasures to mitigate the impact of the attack and ensure service availability.

BCA-6-01T-EC-C3: Introduction to Windows Mobile and IOS

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 4
Pass Percentage: 40%

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

1. The syllabus prescribed should be strictly adhered to.
2. The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course: Introduction to Windows Mobile and IOS	
Course Code: BCA-6-01T-EC-C3	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Gain proficiency in developing mobile applications for both Windows Mobile and iOS platforms, understanding the respective development environments, tools, and programming languages (e.g., C# for Windows Mobile, Swift for iOS).
CO2	Develop skills in designing user interfaces (UI) for both Windows Mobile and iOS applications, considering platform-specific design guidelines and best practices to create intuitive and user-friendly experiences.
CO3	Understand the process of deploying mobile applications on the Windows Mobile Store and Apple App Store, including the submission and review processes for each platform.
CO4	Explore techniques for achieving cross-platform compatibility, either through platform-specific development or by using cross-platform frameworks, allowing the creation of applications that can run on both Windows Mobile and iOS.

| CO5 | Learn about the lifecycle management of mobile applications on Windows Mobile and iOS, including topics such as app states, background processing, and handling interruptions to create responsive and efficient applications. |

Detailed Contents:

Module	Module Name	Module Contents
Section-A		
Module I	**Development Environment**	Development Environment: Introduction to Visual Studio, Advantages of Using Visual Studio, Setting Up Development Environment, Hello World- First Windows App, Simulators in Windows, Emulators and Debugger
Module II	**Introduction to C#**	Introduction to C#: Net Framework, C# (C Sharp), Basics of C# language, Keywords, Variable and Datatypes, Operators, Control Statements, Introduction to Classes, Methods, Properties, Constructors and Destructors, Model View Controller (MVC)
Section-B		
Module III	**Integrating with Web Services in Windows Mobile**	Integrating with Web Services in Windows Mobile: Web Services in ASP.NET, Building the Web Services, Discovering and Manipulating a Device, Functions, Multi-Threading in Windows Mobile: Drawbacks of Multi-Threading, Thread Synchronization, UI Threads
Module IV	**Storage in iOS**	Storage in iOS: Introduction, User Defaults /SQLite/Core Data, Usages and Application of Core Data , Integrating with Web Services in iOS: Data Consumption, Functions, Multi-Threading in iOS: Categories of Thread, Multithreading Models, Thread Synchronization, UI Threats, Background Threads Interaction with Camera in iOS: Introduction to Camera, Interaction with Camera Hardware, Image Capturing

Books

1. Matt Neuburg "Programming iOS 14"
2. Matthijs Hollemans "iOS Apprentice"
3. Charles Petzold "Programming Windows® Phone 7"
4. Christian Nagel, Jon D. Reid, et al. "Professional C# 9 and .NET 5"
5. Paris Buttfield-Addison, Jon Manning, and Tim Nugent "Learning Swift: Building Apps for macOS, iOS, and Beyond"

BCA-6-01P-EC-C3: Introduction to Windows Mobile and IOS Lab

Total Marks: 50
External Marks: 35
Internal Marks: 15
Credits: 2
Pass Percentage: 40%

Course: Introduction to Windows Mobile and IOS Lab
Course Code: BCA-6-01P-EC-C3
Course Outcomes (COs)   After the completion of this course, the students will be able to:

CO1	Attain proficiency in developing mobile applications for both Windows Mobile and iOS platforms, demonstrating the ability to use respective development environments, tools, and programming languages effectively.
CO2	Develop advanced skills in designing user interfaces (UI) for Windows Mobile and iOS applications, adhering to platform-specific design guidelines and creating visually appealing and intuitive user experiences.
CO3	Gain the ability to design and implement applications that run seamlessly on both Windows Mobile and iOS platforms, exploring approaches such as platform-specific development and cross-platform frameworks.
CO4	Learn to integrate and utilize various platform-specific features and functionalities, such as utilizing Windows Mobile and iOS APIs for device-specific capabilities like camera, location services, and notifications.
CO5	Understand the process of deploying mobile applications on the respective app stores (Microsoft Store and Apple App Store), including app submission, review processes, and compliance with store guidelines for both Windows Mobile and iOS.

Detailed List of Programs:

Programme No.	Name of Program
P1	Create a Windows Mobile app that displays a "Hello, Windows!" message.
P2	Develop an app with multiple pages and demonstrate navigation between them using different navigation controls.
P3	Implement a Windows Mobile app that stores and retrieves data using local storage options, such as SQLite or file storage.
P4	Create an app that utilizes the device's camera to capture photos and display them within the application.
P5	Implement a Windows Mobile app that utilizes location services to display the user's current location on a map.
P6	Develop an iOS app that displays a "Hello, iOS!" message.

P7	Create an app with a table view to display a list of items and demonstrate the delegation pattern for handling interactions.
P8	Implement an iOS app that uses Core Data for persistent storage, allowing users to add, edit, and delete records.
P9	Create an app that allows users to access the device's photo library and select images for display within the application.
P10	Develop an iOS app that utilizes MapKit to display a map with specific locations marked.
P11	Create a cross-platform app using a framework like Xamarin or Flutter, ensuring a responsive design that adapts to different screen sizes.
P12	Implement push notifications in both a Windows Mobile and an iOS app, demonstrating the ability to notify users of events or updates.
P13	Develop a cross-platform app that synchronizes data between the Windows Mobile and iOS versions, ensuring consistency.
P14	Implement offline functionality in both Windows Mobile and iOS apps, allowing users to use certain features without an internet connection.
P15	Create a cross-platform app with in-app purchase functionality, demonstrating the process of integrating and testing purchases.
P16	Explore AR features in both Windows Mobile and iOS apps, implementing a simple AR experience.
P17	Implement biometric authentication (fingerprint or face recognition) in both platforms, enhancing app security.
P18	Enhance the accessibility of your apps by implementing features like VoiceOver (iOS) or Narrator (Windows Mobile).
P19	Create custom animations within your apps to enhance the user interface and overall user experience.
P20	Implement integration with cloud services such as Azure or Firebase in both Windows Mobile and iOS apps, showcasing data synchronization and storage in the cloud.

BCA-6-02P: Minor Project

Course: Minor Project	
Course Code: BCA-6-02P	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Demonstrate a technical knowledge of their selected project topic.
CO2	Gain ability to identify research gaps through literature survey, problem identification, formulation and solution.
CO3	Design solutions to problems utilizing a systems approach.
CO4	Gain ability of communication, management, leadership and entrepreneurship skills.
CO5	Obtain capability and enthusiasm for self-improvement through continuous professional development and life-long learning

Description

To develop project in the field of Computer Science & Applications

Study projects can be individual or team projects. Team projects are limited to a maximum number of 2 students (and should be defined according to the complexity of the study).

At the beginning of the 6th semester (deadline 15 March for Jan Admission Cycle and 15 October for July Admission Cycle) every student /group has to submit his/her application for the study project to the Course Coordinator for the approval of topic and team members. Within 15 days after approval the topic, the students have to write a project synopsis. The project synopsis should follow a scientific structure and consists basically of the following parts:

1. INTRODUCTION (1 PARAGRAPH)

2 LITERATURE SURVEY (2-3 pages)

(reviews of 4-5 papers/journals/articles/techniques/wares/etc)

3. RESEARCH GAPS (1 paragraph)

4. PROBLEM FORMULATION (1 paragraph)

5. OBJECTIVES OF ROJECT

The major aim of this project is to .... To achieve the major aim, following objectives are proposed for the study

1.

2.

3.

6. METHODOLOGY/PLANNING OF WORK (1 page)

Research type, unit, methods, tools of data collection / analysis. Methodology will include the steps to be followed to achieve the objective of the project during the project development.

7. H/W AND S/W REQUIREMENTS (1 paragraph)

Software/Hardware required for the development of the project

8. EXPECTED OUTCOMES (1 paragraph)

At the end of the study project, the students have to write a project report. The project report should follow a scientific structure and consists basically of the following parts:

1. INTRODUCTION

2 LITERATURE SURVEY

3. PROBLEM FORMULATION

4. OBJECTIVES OF PROJECT WORK

The major aim of this project is to .... To achieve the major aim, following objectives are proposed for the study

1.

2.

3.

5. METHODOLOGY

6. MAJOR FINDINGS

7. CONCLUSIONS & FUTURE SCOPE

The length of the final project report should be about 20-25 A4 pages (about 6000-7500 words).

The due date for the final version of the report is at least one week before the official presentation. The duration of the presentation is 7-10 minutes with an additional 5 minutes for discussions.

BCA-6-03T: Technical Report Writing & IPR

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 4
Pass Percentage: 40%

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

1. The syllabus prescribed should be strictly adhered to.
2. The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
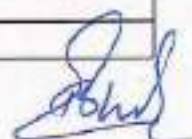5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course: Technical Report Writing & IPR
Course Code: BCA-6-03T
Course Outcomes (COs) After the completion of this course, the students will be able to:

CO1	Understand the purpose and importance of technical report writing.
CO2	Identify different types of technical reports and their specific requirements.
CO3	Utilize various data visualization techniques to present technical information effectively.
CO4	Understand the Intellectual Property (IP) Concepts.
CO5	Understand the Procedure for grants of patents.

Detailed Contents:

Module	Module Name	Module Contents
Section-A		

Module I	**Introduction to Technical Report Writing & Types of Technical Reports**	**Introduction to Technical Report Writing** • Definition and importance of technical reports • Characteristics of effective technical writing • Differences between technical and non-technical writing **Types of Technical Reports** • Formal reports • Informal reports • Progress reports • Feasibility studies • Laboratory reports • Research reports
Module II	**Data Visualization Techniques & Citation and Referencing**	**Data Visualization Techniques** • Graphs, charts, and tables • Best practices for presenting data visually • Choosing the appropriate visualization for different types of data **Citation and Referencing** • Importance of citing sources in technical writing • Overview of common citation styles (e.g., APA, IEEE, Chicago) • Guidelines for citing various types of sources (e.g., books, journals, websites)
Section-B		
Module III	**Interpretation and Report Writing**	Effective technical writing, how to write a report, Paper Developing a Research Proposal, Format of research proposal, presentation and assessment by a review committee. Interpretation of Data and Paper Writing – Layout of a Research Paper, Journals in Computer Science, Impact factor of Journals, When and where to publish? Ethical issues related to publishing, Plagiarism and Self-Plagiarism.
Module IV	**IPR**	Nature of Intellectual Property: Patents, Designs, Trade and Copyrights. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property, Procedure for grants of patents, Patenting under PCT

References

1. Kompal Bansal & Parshit Bansal, "Fundamentals of IPR for Beginner's", 1st Ed., BS Publications, 2016.

2. William S. Pfeiffer and Kaye A. Adkins, "Technical Communication: A Practical Approach", Pearson.

3. Ramappa,T., "Intellectual Property Rights Under WTO", 2nd Ed., S Chand, 2015

BCA-6-04: Summer Internship

Course: Summer Internship	
Course Code: BCA-6-04	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Acquire knowledge of various programming languages and tools.
CO2	Acquire knowledge of software engineering process life cycles and its implementation.
CO3	Learn testing of software systems.
CO4	Acquire knowledge of industry day to day operations and learn to document project work.
CO5	Able to demonstrate technical and communication skills.

Description

During 6th semester, students will gain 120 hours industrial/company experience. At the beginning of the 6th semester (deadline 15 March for Jan Admission Cycle and 15 October for July Admission Cycle), every student has to submit the name of industrial/company where training will be performed to the Course Coordinator. After completion of training, students will submit training Certificate, Training Manual and Confidential Report with Grade (A++, A+, A, B++, B+, C, D, F) to the Course Coordinator.

Students are required to maintain Training Manual regularly signed by supervisor in the industry/Company.

Internal evaluation and external evaluation is done based on Training Manual and Confidential Report submitted by the supervisor of the industry/company to the Course Coordinator.

28/01/25

Semester-VII

28/01/25

BCA-7-01T: Research Methodology & Statistical Analysis

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 6
Pass Percentage: 40%

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

1. The syllabus prescribed should be strictly adhered to.
2. The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course: Research Methodology & Statistical Analysis	
Course Code: BCA-7-01T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Identify and differentiate between various research methodologies, including qualitative, quantitative, and mixed methods.
CO2	Understand the principles underlying each research approach and their suitability for different types of research questions and objectives..
CO3	Develop skills in designing research studies, including formulating research questions, hypotheses, and objectives.
CO4	Demonstrate an understanding of ethical considerations in research design and implementation.
CO5	Gain proficiency in basic statistical concepts, including descriptive statistics, inferential statistics, and hypothesis testing.

Detailed Contents:

Module	Module Name	Module Contents
		Section-A
Module I	Foundations of Research	Foundations of Research: Meaning, Objectives, Motivation, Utility. Concept of theory, empiricism, deductive and inductive theory. Characteristics of scientific method– Understanding the language of research – Concept, Construct, Definition, Variable. Research Process
Module II	Problem Identification & Formulation	Problem Identification & Formulation: Research Question – Investigation Question – Measurement Issues – Hypothesis – Qualities of a good Hypothesis –Null Hypothesis & Alternative Hypothesis. Hypothesis Testing – Logic & Importance
Module III	Research Design	Research Design: Concept and Importance in Research – Features of a good research design – Exploratory Research Design – concept, types and uses, Descriptive Research Designs – concept, types and uses. Experimental Design: Concept of Independent & Dependent variables.
		Section-B
Module IV	Qualitative and Quantitative Research	Qualitative and Quantitative Research: Qualitative research – Quantitative research – Concept of measurement, causality, generalization, replication. Merging the two approaches.
Module V	Sampling	Sampling: Concepts of Statistical Population, Sample, Sampling Frame, Sampling Error, Sample Size, Non Response. Characteristics of a good sample. Probability Sample – Simple Random Sample, Systematic Sample, Stratified Random Sample & Multi-stage sampling. Determining size of the sample – Practical considerations in sampling and sample size.
Module VI	Data Analysis	Data Analysis: Data Preparation – Univariate analysis (frequency tables, bar charts, pie charts, percentages), Bivariate analysis – Cross tabulations and Chi-square test including testing hypothesis of association.

Books

1.	Cooper, D. R. and Schindler, P.S., "Business Research Methods", Tata McGraw Hill, New Delhi.
2.	Kothari, C. R., "Research Methodology", New Age International.
3.	Zikmund, Millian G., "Business Research Methods", Thomson Learning, Bombay.
4.	Geode, Millian J. & Paul K. Hatl, "Methods in Research Methods", Tata Mc Graw Hills, New Delhi
5.	Gupta S. P., "Statistical Methods", Sultan Chand, Delhi

BCA-7-02T: Optimization Techniques

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 6
Pass Percentage: 40%

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

1. The syllabus prescribed should be strictly adhered to.
2. The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course: Optimization Techniques	
Course Code: BCA-7-02T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Define and explain optimization problems in various domains.
CO2	Analyze the optimality criteria for various optimization techniques.
CO3	Translate practical problems into mathematical expressions for optimization.
CO4	Understand the concepts of Genetic programming.
CO5	Analyze optimization methods based on the behavior of biological and swarm of insects.

Detailed Contents:

Module	Module Name	Module Contents
	Section-A	
Module 1	Optimization Models	OR models, solving the OR Model, Introduction to Linear Programming, two-variable LP model, Graphical LP Solution, Graphical sensitivity

		Analysis, Simplex Method, Big M Method, Two Phase Method, Special cases in Simplex Method Application.
Module II	Duality and Sensitivity Analysis	Definition of the Dual problem, Primal dual relationship, Additional Simplex Algorithm for LP, Post optimal or Sensitivity Analysis. Transportation Model, Transportation Algorithm, Assignment Model.
Module III	Networks Models	Definition, Minimum spanning trees algorithms, Shortest Route Problem, Maximum flow Model, Minimum Cost Capacitors flow problem, PERT & CPM.
Section-B		
Module IV	Non-Linear Programming	Unconstrained Algorithms, Direct search Method, Gradient Method, Constrained Algorithm, Separable programming, Quadratic Programming, Geometric Programming
Module V	Intelligent Optimization	Introduction to Intelligent Optimization, Optimization methods based on the behavior of biological and swarm of insects, Genetic Algorithm, Simulated Annealing Algorithm, Particle Swarm Optimization (PSO)
Module VI	Genetic Algorithm	Genetic Algorithm: Types of reproduction operators, crossover & mutation, Genetic Programming (GP): Principles of genetic programming, terminal sets, functional sets, differences between GA & GP, random population generation, solving differential equations using GP.

Books

1. S. S. Rao, "Engineering Optimization: Theory and Practice", Wiley, 2008.

2. K. Deb, "Optimization for Engineering design algorithms and Examples", Prentice Hall, 2nd edition 2012.

3. C.J. Ray, "Optimum Design of Mechanical Elements", Wiley, 2007.

4. R. Saravanan, "Manufacturing Optimization through Intelligent Techniques", Taylor & Francis Publications, 2006.

5. D. E. Goldberg, "Genetic algorithms in Search, Optimization, and Machine Learning", Addison-Wesley Longman Publishing, 1989

BCA-7-03T: Digital Image Processing

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 4
Pass Percentage: 40%

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

1. The syllabus prescribed should be strictly adhered to.
2. The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
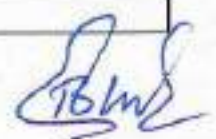5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course: Digital Image Processing
Course Code: BCA-7-03T
Course Outcomes (COs) After the completion of this course, the students will be able to:

CO1	Define digital images and understand the principles of image representation, including pixel values, color spaces, and image formats.
CO2	Gain proficiency in basic image enhancement techniques, including contrast enhancement, brightness adjustment, and histogram equalization.
CO3	Understand advanced enhancement techniques, such as spatial domain filtering, frequency domain filtering, and adaptive enhancement methods.
CO4	Gain an understanding of image compression techniques to reduce storage space and transmission bandwidth requirements.
CO5	Develop skills in image segmentation techniques for partitioning images into meaningful regions or objects.

Detailed Contents:

Module	Module Name	Module Contents

Section-A		
Module 1	Introduction to image processing	Introduction to image processing: • Fundamentals • Applications • Image processing system components • Image sensing and acquisition • Sampling and quantization • Neighbors of pixel adjacency connectivity • Regions and boundaries • Distance measure
Module II	Image Enhancement	Image Enhancement: • Frequency and Spatial Domain • Contrast Stretching • Histogram Equalization • Low pass and High pass filtering
Section-B		
Module IV	Color Image Processing	Color Image Processing: • Color models • Pseudo color Image processing • Color transformation and segmentation.
Module V	Image Compression	Image Compression: • Fundamentals • Models • Error free and lossy compression • Standards.

Books

1. Rafel C. Gonzalez and Richard E. Woods, "Digital Image Processing", 2nd Edition, Pearson Education

2. Bhabatosh Chanda and Dwijesh Majumder, "Digital Image Processing", PHI

3. Anil K Jain, "Fundamentals of Digital Image Processing", PHI

4. Rafel C. Gonzalez and Richard E. Woods, "Digital Image Processing using MATLAB", 2nd Edition, Pearson Education

BCA-7-03T: Digital Image Processing Lab

Total Marks: 50
External Marks: 35
Internal Marks: 15
Credits: 2
Pass Percentage: 40%

Course Name: Digital Image Processing Lab Course Code: BCA-7-03P	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO 1	Understand the basic functionalities and user interfaces of these tools for performing various image processing tasks.
CO 2	Gain hands-on experience with techniques such as contrast stretching, histogram equalization, and spatial filtering for enhancing image quality
CO 3	Implement image segmentation algorithms to partition images into meaningful regions or objects.
CO 4	Implement image compression algorithms to reduce the size of digital images while preserving visual quality.
CO5	Gain hands-on experience to enhance image the quality of images using spatial filters

Detailed Contents:

Experimental work in Python Programming

S. No.	Name of Experiments
1	Image Printing Program Based on Half toning.
2	Reducing the Number of Intensity Levels in an Image.
3	Zooming and Shrinking Images by Pixel Replication.
4	Zooming and Shrinking Images by Bilinear Interpolation.
5	Apply Arithmetic Operations on Images.
6	Image Enhancement Using Intensity Transformations.
7	Image Enhancement using Histogram Equalization.
8	Image Enhancement using Spatial Filtering

9	Image Enhancement Using the Laplacian.
10	Implementation of Image Segmentation Algorithm
11	Implementation of Image Compression Algorithms

BCA-7-04T: Entrepreneurship Development

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 6
Pass Percentage: 40%

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

1. The syllabus prescribed should be strictly adhered to.
2. The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course: Entrepreneurship Development	
Course Code: BCA-7-04T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Develop an entrepreneurial mindset, fostering creativity, and innovation.
CO2	Acquire the skills to create comprehensive business plans, including market analysis, financial projections, and operational strategies.
CO3	Gain a solid understanding of financial principles relevant to entrepreneurship, including budgeting, financial forecasting, and resource allocation.
CO4	Develop the ability to assess and manage risks associated with entrepreneurial ventures.
CO5	Cultivate effective networking and communication skills crucial for entrepreneurship.

Detailed Contents:

Module	Module Name	Module Contents
Section A		
Module 1	Entrepreneurship	Types of Entrepreneurs, Difference between Entrepreneur and Intrapreneur Entrepreneurship in Economic growth, Factors affecting entrepreneurial growth.
Module II	Entrepreneurial Motivation	Major motives influencing an Entrepreneur, Achievement motivation training, self-rating, business games, thematic apperception test, stress management, entrepreneurship development programs, need, objectives.
Module III	Entrepreneur Business	Small Enterprises, Definition, Classification, Characteristics, Ownership Structures, Project Formulation, Steps involved in setting up a Business, identifying, selecting a Good Business opportunity, Market Survey and Research, Techno Economic Feasibility Assessment, Preparation of Preliminary Project Reports, Project Appraisal, Sources of Information, Classification of Needs and Agencies.
Section-B		
Module IV	Finance and Accounting in relation to Entrepreneurship	Need, Sources of Finance, Term Loans, Capital Structure, Financial Institution, Management of working Capital, Costing, Break Even Analysis, and Taxation, Income Tax, GST.
Module V	Support to Entrepreneurs	Sickness in small Business, Concept, Magnitude, Causes and Consequences, Corrective Measures, Business Incubators
Module VI	Government Policies	Government Policy for Small Scale Enterprises, Growth Strategies in small industry, Expansion, Diversification, Joint Venture, Merger and Sub Contracting.

Books

1. Khanka. S.S., "Entrepreneurial Development", S. Chand & Co. Ltd., Ram Nagar, New Delhi, 2013.

2. Donald F Kuratko, "Entrepreneurship – Theory, Process and Practice", 9th Ed., Cengage Learning, 2014.

3. Hisrich R D, Peters M P, "Entrepreneurship" 8th Ed., Tata McGraw-Hill, 2013.

4. Mathew J Manimala, "Entrepreneurship theory at cross roads: paradigms and praxis", 2nd Ed. Dream Tech, 2005.

5. Rajeev Roy, "Entrepreneurship", 2nd Ed., Oxford University Press, 2011.

6. EDII, "Faulty and External Experts – A Hand Book for New Entrepreneurs", Publishers; Entrepreneurship Development", Institute of India, Ahmadabad,1986.

28/01/25

Semester-VIII

28/01/25

BCA-8-01T: Organizational Behavior

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 4
Pass Percentage: 40%

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

1. The syllabus prescribed should be strictly adhered to.
2. The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course: Organizational Behavior	
Course Code: BCA-8-01T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Identify and describe key individual differences and personality traits that influence behavior in the workplace.
CO2	Demonstrate an understanding of the impact of communication, conflict, and leadership on group behavior.
CO3	Analyze the components of organizational culture and assess its influence on employee behavior.
CO4	Evaluate different leadership theories and styles, and apply them to real-world leadership scenarios.
CO5	Propose strategies for creating a positive work environment that promotes employee well-being.

Detailed Contents:

Module	Module Name	Module Contents
Section-A		
Module 1	**Organisational Structure**	Nature and Scope of Management, Evolution of Management thought, Manager & environment. Business Ethics. Decision making: meaning and process, creative elements in decision making, Analytical tools to decision making. Functions of a manager, planning: concept, objective, significance, process and types, reasons for failure in plans; organizing concept, principles, theories, Formal & Informal organizations.
Module II	**Motivation**	Need, Theories of motivation. Leadership: Concept, Theories and Leadership Styles; Communication: Communication process; Barriers to effective communication; Types of organizational communication; Improving communication; Transactional analysis in Communication; Controlling.
Section-B		
Module III	**Organisational Behaviour**	Concept, Significance; Relationship between Management & Organizational Behavior; Perception; Learning Personality. Group Dynamics and Team Development; Group dynamics: Definition and importance, types of groups, group formation, group development, group composition, group performance factors; team development.
Module IV	**Organisation Culture**	Concept, Creating & Sustaining Culture, learning culture; Work stress & its management. Organizational Development: Concept, Need for change, Resistance to change, Theory of Planned Change, Organizational Diagnosis, OD intervention.

Books

1. Harold Koontz and Heinz Weihrich, "Essentials of Management: An International Perspective", McGraw-Hill, New Delhi.

2. Stephen P Robbins, David A. Decanzo, "Fundamentals of Management", Pearson Education, New Delhi.

3. Stephen P. Robbins, Timothy A. Judge, Seema Sanghi, "Organizational Behavior", Pearson Education, New Delhi.

4. K. Aswathappa, Organisational Behaviour, "Text, Cases and Games", Himalaya Publishing.

5. Fred Luthans, "Organizational Behavior", McGraw Hill.

BCA-8-02T: Web Designing & Development

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 4
Pass Percentage: 40%

Course: Web Designing & Development	
Course Code: BCA-2-02T	
Course Outcomes (COs)	
After the completion of this course, the students will be able to:	
CO1	Understand characteristics of a website.
CO2	Understand web Programming Technologies: Programming Languages, Frameworks, Libraries, Databases
CO3	Learn about design principles such as layout, typography, color theory, and user experience (UX) design, and how these principles apply to web design.
CO4	Learn how to use graphics and multimedia elements, such as images, videos, and animations, to enhance the visual appeal and interactivity of websites.
CO5	Gain practical experience with web development tools and frameworks, such as Bootstrap, jQuery, and AngularJS, to streamline the development process and enhance website functionality.

Detailed Contents:

Module	Module Name	Module Contents
Module I	Introduction to Web Programming	Basic Concepts of WWW, Web page, Hyper Text Markup Language (HTML), Hypertext and Hypermedia, Hypertext Transfer Protocol, Server, Web Browsers, Uniform Resource Locator (URL), Domain Name, IP Address or Number, Characteristics of a Website.

Module II	HTML	Client-Side Scripting, Server-Side Scripting, Static and Dynamic Websites, Frontend and Backend Development, Web Application Process Model, Web Programming Technologies: Programming Languages, Frameworks, Libraries, Databases Introduction, HTML Tags, HTML DOM, developing a Web Page, Commonly Used HTML Tags: Header and Footer, Text Formatting, Paragraphs, Text Style, Lists and Bullets, Creating Tables in HTML, Components of table, Border Attribute, Width and Height Attribute, Align Attribute, Cell Padding and Cell Spacing Attributes, Column Span and Row Span Attributes, Inserting Images in HTML, Hyperlinks, Hyperlink of an email, Hyperlink to another browser page, HTML Multimedia, HTML Plugins, HTML Forms
Module III	JavaScript	Introduction, JavaScript Syntax, JavaScript Program, JavaScript Variables, JavaScript Operators, JavaScript Data Types, JavaScript Functions, JavaScript Variable Scope: Global Scope, Local Scope, JavaScript Strings: String Length, Special Characters, Breaking Long Code lines, JavaScript Arrays: Converting Array to String, Popping and Pushing Introduction, JavaScript Switch, JavaScript Loops, JavaScript Events, JavaScript Forms, JavaScript - III: Introduction, DOM Introduction, DOM Methods, DOM Document, DOM Events, JavaScript Window Screen, JavaScript Window Location, JavaScript Window Navigator, JavaScript Popup Boxes
Module IV	AngularJS	Introduction, AngularJS Development Environment, Expressions in AngularJS, AngularJS Directives, Data Binding, AngularJS Model Modes, One Way Binding, Two Way Binding, AngularJS Controller, AngularJS Scope, AngularJS Filters, AngularJS Forms

Books

1. Steven A. Gabarro, "Web Application Design and Implementation", Wiley, 2006
2. Thomas A. Powell, "HTML: The Complete Refence", McGraw-Hill
3. Pankaj Sharma, "Web Technology", Sk Kataria & Sons Bangalore 2011.
4. Mike Mcgrath, "Java Script", Dream Tech Press 2006, 1st Ed.
5. Achyut S Godbole & Atul Kahate, "Web Technologies", 2002, 2nd Ed.

6. Laura Lemay, Rafe Colburn, Jennifer Kyrnin, "Mastering HTML, CSS & Javascript Web Publishing", 2016.
7. DT Editorial Services (Author), "HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery)", Paperback 2016, 2nd Ed.
8. C. Xavier, "World Wide Web Design with HTML", TMH Publishers, 2001.
9. Wendy Willard, "A Beginners Guide HTML", Tata McGraw Hill, 2009, 4th Ed.

BCA-2-02P: Web Designing & Development Lab

Course: Web Designing & Development Lab	
Course Code: BCA-2-02P	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Understanding of the structure and syntax of HTML, including elements, attributes, and how to create well-formed HTML documents.
CO2	Create basic web pages using HTML, including adding text, images, links, lists, tables, forms, and other elements.
CO3	Understand the fundamentals of JavaScript programming, including variables, data types, operators, and control structures, and be able to use JavaScript to create interactive and dynamic web content.
CO4	Develop client-side scripts using JavaScript to enhance the functionality and interactivity of web pages.
CO5	Understanding of the core concepts of AngularJS, including directives, controllers, services, filters, and modules.

Detailed about Experimental Tasks:

Experimental Task No.	Experimental Description
T1	Write simple steps to create a basic HTML document
T2	Design a page having suitable background colour and text colour with title "My First Web Page" using all the attributes of the Font tag.
T3	Create a HTML document giving details of your [Name, Age], [Address, Phone] and [Register Number, Class] aligned in proper order using alignment attributes of Paragraph tag
T4	Write HTML code to design a page containing some text in a paragraph by giving suitable heading style.
T5	Write HTML code to create a Web Page that contains an Image at its centre.

T6	Create a web page with an appropriate image towards the left-hand side of the page, when user clicks on the image another web page should open
T7	Create web Pages using Anchor tag with its attributes for external links.
T8	Create a web page for internal links; when the user clicks on different links on the web page it should go to the appropriate locations/sections in the same page
T9	Write a HTML code to create a web page with pink color background and display moving message in red color
T10	Create a web page, showing an ordered list of all second semester courses
T11	Create a web page, showing an unordered list of names of all the PG Programmes (Schools wise) in JGND PSOU, Patiala
T12	Create a HTML document containing a nested list showing a content page of any book.
T13	Create a web page which divides the page in two equal frames and place the audio and video clips in frame-1 and frame-2 respectively.
T14	Create a web page using Embedded CSS and Multimedia
T15	Create web pages to understand and use to validate user inputs. Validate the Registration, user login, user profile and payment by credit card pages using JavaScript
T16	Create Student record and Perform following Operations: Design a form and insert data into database. *Add Record, delete and edit, Search Record.*
T17	Create web pages to learn how to navigate between web pages and servers.
T18	Develop Angular JS program to create a login form, with validation for the user name and password fields.

BCA-8-03P: Research Project

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Total Marks: 200
External Marks: 140
Internal Marks: 60
Credits: 12
Pass Percentage: 40%

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Course: Research Project	
Course Code: BCA-8-03P	
Course Outcomes (COs)	
After the completion of this course, the students will be able to:	
CO1	Demonstrate an advanced technical knowledge of their selected project topic.
CO2	Gain ability to identify research gaps through literature survey, problem identification, formulation and solution.
CO3	Design solutions to problems utilizing a systems approach
CO4	Gain ability of communication, management, leadership and entrepreneurship skills.
CO5	Obtain capability and enthusiasm for self-improvement through continuous professional development and life-long learning.

Description

To develop project in the field of Computer Science & Applications

Study projects can be individual or team projects. Team projects are limited to a maximum number of 2 students (and should be defined according to the complexity of the study).

At the beginning of the 8th semester (deadline 15 March for Jan Admission Cycle and 15 October for July Admission Cycle) every student /group has to submit his/her application for the study project to the Course Coordinator for the approval of topic and team members. Within 15 days after approval the topic, the students have to write a project synopsis. The project synopsis should follow a scientific structure and consists basically of the following parts:

1. INTRODUCTION (1 PARAGRAPH)

2 LITERATURE SURVEY (2-3 pages)

(reviews of 4-5 papers/journals/articles/techniques/wares/etc)

3. RESEARCH GAPS (1 paragraph)

4. PROBLEM FORMULATION (1 paragraph)

5. OBJECTIVES OF ROJECT

The major aim of this project is to .... To achieve the major aim, following objectives are proposed for the study

1.

2.

3.

6. METHODOLOGY/PLANNING OF WORK (1 page)

Research type, unit, methods, tools of data collection / analysis. Methodology will include the steps to be followed to achieve the objective of the project during the project development.

7. H/W AND S/W REQUIREMENTS (1 paragraph)

Software/Hardware required for the development of the project

8. EXPECTED OUTCOMES (1 paragraph)

At the end of the study project, the students have to write a project report. The project report should follow a scientific structure and consists basically of the following parts:

1. INTRODUCTION

2 LITERATURE SURVEY

3. PROBLEM FORMULATION

4. OBJECTIVES OF PROJECT WORK

The major aim of this project is to .... To achieve the major aim, following objectives are proposed for the study

1.

2.

3.

5. METHODOLOGY

6. MAJOR FINDINGS

7. CONCLUSIONS & FUTURE SCOPE

The length of the final project report should be about 30-35 A4 pages (about 9000-10500 words).

The due date for the final version of the report is at least one week before the official presentation. The duration of the presentation is 10-15 minutes with an additional 7 minutes for discussions.

Students will present their research findings in National/International Conferences/Seminars or published in the form of a paper in Conferences/Seminars Proceedings/Book Chapters/Journals.

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