

Revised

Scheme of Examination for BCA (Industry Integrated)

Semester: 3rd (w.e.f. Session 2024-25)

Sr. No.	Course/ Paper Code	Title of the Course	Mode of Learning	Course Type	Credit			Contact Hours per Week				Examination Scheme				Total Marks
					Theory	Practical/ Seminar	Total	Theory	Practical /Seminar	Total	End Semester Exam	Internal Assessment	Practical (External)	Practical (Internal)		
1	23BCAL-N-301	Java Programming	CL/BL	CC	3	-	3	3	-	3	80	20	-	-	100	
2	23BCAL-N-302	Operating system	CL/BL	CC	3	-	3	3	..	3	80	20	-	-	100	
3	23BCAL-N-303	Internet of Things	CL/BL	CC	3	-	3	3	..	3	80	20	-	-	100	
4	23BCAL-N-304	Data Analysis using Excel	CL/BL	MIC	2	-	2	2	-	2	80	20	-	-	100	
5	23BCAL-N-305	Probability Theory	CL/BL	AEC	2	..	2	2	..	2	80	20	-	-	100	
6	23BCAL-N-306	Internship	CL	SEC	..	4	4	..	-	4	-	-	80	20	100	
7	23BCAL-N-307	Discrete Mathematics	CL	MDC	3	..	3	3	..	3	80	20	-	-	100	
8	23BCAL-N-308	Environmental Studies	CL	VAC	2	..	2	2	..	2	40	10	-	-	50	
9	23BCAL-N-309	Lab-I: Based on Java Programming	CL	CC	-	-	1	-	2	2	-	-	80	20	100	
10	23BCAL-N-310	Lab-II: Based on Data Analysis using Excel	CL	CC	-	-	1	-	2	2	-	-	80	20	100	
Total							24		4	26					950	

CC - Core Course; SEC-Skill Enhancement Course; AEC: Ability Enhancement Course MDC: Multidisciplinary Course VAC: Value Added course

MIC: Minor course

23BCAI- N-301	Java Programming	3L:0T:0P	3 Credits
---------------	------------------	----------	-----------

Maximum Marks:100
External Examination: 80
Internal Assessment: 20
Max. Time: 3 Hrs

Course Objectives

- To introduce the object-oriented programming concepts.
- To understand object-oriented programming concepts, and apply them in solving problems.
- To introduce the principles of inheritance and polymorphism; and demonstrate how they relate to the design of abstract classes
- To introduce the implementation of packages and interfaces
- To introduce the concepts of exception handling and multithreading.
- To introduce the design of Graphical User Interface using applets.

Note: There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Students will have to attempt one question from each unit. Each question shall carry equal marks.

Unit I

Object Oriented Programming and Java Fundamentals: Structure of Java programs, Classes and Objects, Data types, Type Casting, Looping Constructs.

Unit II

Interfaces: Interface basics; Defining, implementing and extending interfaces; Implementing multiple inheritance using interfaces. Packages: Basics of packages, Creating and accessing packages, System packages, Creating user defined packages

Unit III

Exception handling using the main keywords of exception handling: try, catch, throw, throws and finally; Nested try, multiple catch statements, creating user defined exceptions. File Handling Byte Stream, Character Stream, File I/O Basics, File Operations

Unit IV

AWT and Event Handling: The AWT class hierarchy, Events, Event sources, Event classes, Event Listeners, Relationship between Event sources and Listeners, Delegation event model, Creating GUI applications using AWT.

Course Outcomes

- Able to solve real world problems using OOP techniques.
- Able to understand the use of abstract classes.
- Able to solve problems using java collection framework and I/o classes.
- Able to develop multithreaded applications with synchronization.



- Able to develop applets for web applications.
- Able to design GUI based applications consisting of multiple classes.

Suggested Readings:

1. Balagurusamy, E., "Programming with JAVA, Tata McGraw Hill.
2. The Complete Reference JAVA, TMH Publication.
3. Beginning JAVA, Ivor Horton, WROX Public.
4. JAVA 2 UNLEASHED, Tech Media Publications.
5. Patrick Naughton and Herbertz Schildt, "Java-2 The Complete Reference", TMH.

A handwritten signature in purple ink, located in the bottom right corner of the page. The signature is stylized and appears to be a name followed by a surname, possibly "Murali" or similar.

23BCAI- N-302	Operating system	3L:0T:0P	3 Credits
---------------	------------------	----------	-----------

Maximum Marks:100
External Examination: 80
Internal Assessment: 20
Max. Time: 3 Hrs

Course Objectives

- To understand the basic concepts, functions and types of operating systems.
- To understand Processes and Process scheduling
- To understand the concept of Deadlocks
- To analyze various memory management schemes.
- To understand I/O management and File systems.

Note: There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Students will have to attempt one question from each unit. Each question shall carry equal marks.

Unit I

Introduction: Introduction to Operating System Concepts (Including Multitasking, Multiprogramming, Multi User, Multithreading etc.), Types of Operating Systems: Batch Operating System, Time-Sharing System, Distributed Operating System, Network Operating System, Real Time Operating System, Various Operating System services, architecture, System Programs and Calls.

Unit II

Process Management: Process Concept, Process Scheduling, Operations on Processes; CPU Scheduling, Scheduling Criteria, Scheduling Algorithms- First come First Serve (FCFS), Shortest- Job- First (SJF), Priority Scheduling, Round Robin (RR).

Deadlock: Methods for handling deadlock- Deadlock prevention, Avoidance

Unit III

Memory Management: Logical & Physical Address Space, Swapping, Contiguous Memory allocation, non-contiguous memory allocation, paging and segmentation techniques; Virtual Memory Management- Demand Paging & Page Replacement Algorithm; Demand Segmentation.

Unit IV

File System: Different types of files and their access methods, directory structures, various allocation methods, disk scheduling and management and its associated algorithms.

Course Outcomes

- Analyze various scheduling algorithms.
- Understand deadlock, prevention and avoidance algorithms.
- Compare and contrast various memory management schemes.
- Understand the functionality of file systems

Suggested Readings:

1. Operating System Concepts by Silberschatz et al 5th Edition 1998, Addison-Wesley.
2. Modern Operating System by A. Tanenbaum, 1992, Prentice Hall
3. Operating System By Peterson, 1985, AW.
4. Operating System By Milankovik, 1990, THM
5. Operating System Incorporating with Unix & Windows by Colin Ritchie, 1974, THM.

A handwritten signature in purple ink, located in the bottom right corner of the page. The signature is stylized and appears to be a name, possibly "Anuraag", followed by a horizontal line.

23BCAI- N-303	Internet of Things	3L:0T:0P	3 Credits
---------------	--------------------	----------	-----------

Maximum Marks:100
External Examination: 80
Internal Assessment: 20
Max. Time: 3 Hrs

Course Objectives

1. Students will understand the concepts of Internet of Things and can able to build IoT applications
2. To learn different applications in IOT.
3. To learn different protocols used in IOT.
4. To learn the concepts of smart city development in IOT.
5. To learn how to analysis the data in IOT

Note: There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Students will have to attempt one question from each unit. Each question shall carry equal marks.

Unit I

Introduction to IoT: Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs;

Unit II

Sensors Networks : Definition, Types of Sensors, Types of Actuators, Examples and Working, IoT Development Boards: Arduino IDE and Board Types, RaspberriPi Development Kit, RFID Principles and components, Wireless Sensor Networks: History and Context, The node, Connecting nodes, Networking Nodes, WSN and IoT.

Unit III

IoT&M2M: Machine to Machine, Difference between IoT and M2M, Software define Network,

Data Handling& Analytics: Introduction, Bigdata, Types of data, Characteristics of Big data, Data handling Technologies, Introduction to Hadoop.

Unit IV

Applications of IoT: Home Automation, Smart Cities, Energy, Retail Management, Logistics, Agriculture, Health and Lifestyle, Industrial IoT, Legal challenges, IoT design Ethics, IoT in Environmental Protection.

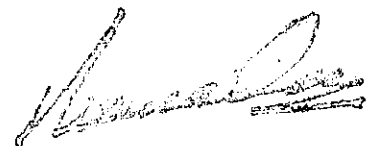


Course Outcome:

1. Understand how the IoT is different from traditional systems.
2. Demonstrate the revolution of internet in mobile and cloud.
3. Examine the architecture and operation of IoT.
4. Explore various tools and programming paradigms for IoT applications.
2. Develop an IoT prototype for real time scenario.
3. Understand the building blocks of IoT and security aspects.

Suggested Readings:

1. Raj Kamal, Internet of Things, Architecture and Design Principles, 1st edition, McGraw Hill Education, May 2017.
2. Arsheep Baga and Vijay Madisetti, Internet of Things: A Hands-On Approach, 1st Edition, Universities press, 2015.
3. J. Biron and J. Follett, "Foundational Elements of an IoT Solution", O'Reilly Media, 2016

A handwritten signature in black ink, located in the bottom right corner of the page. The signature is stylized and appears to be a cursive name.

23BCAI-N-304	Data Analysis using Excel	2L:0T:0P	2 Credits
--------------	---------------------------	----------	-----------

Maximum Marks:100
External Examination: 80
Internal Assessment: 20
Max. Time: 3 Hrs

Course Objectives

- Understand the fundamental elements of a dashboard, including charts, tables, and visuals, to effectively present data-driven insights.
- Develop skills in utilizing advanced data analysis tools to derive actionable insights and drive data-informed decision-making processes.
- Explore methods for linking Excel with databases, facilitating seamless data exchange between Excel and external data sources such as Access and SQL Server.

Note: There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Students will have to attempt one question from each unit. Each question shall carry equal marks.

Unit I

Introduction to Excel for Data Analysis-Overview of Excel interface, Basics of spreadsheets, Data types and formats, Basic formulas and functions. Data Entry and Cleaning- Data entry techniques, importing data from various sources (CSV, Text, Web), Data cleaning techniques, removing duplicates, handling missing values.

Unit II

Basic Data Manipulation- Sorting and filtering data, using tables in Excel, Conditional formatting, Data validation, Advanced Formulas and Functions- Logical functions: IF, AND, OR; Lookup functions: VLOOKUP, HLOOKUP, INDEX, MATCH; Text functions: CONCATENATE, LEFT, RIGHT, MID, TRIM, Date and time functions

Unit III

Data Analysis Techniques-Descriptive statistics: mean, median, mode, standard deviation, Using the Analysis Toolpack, PivotTables and PivotCharts, Grouping and summarizing data
Data Visualization- Creating and formatting charts: bar, line, pie, scatter, Advanced charting techniques, Using Sparklines, Dynamic charts with interactive controls.

Unit IV

Introduction to Dashboards- Elements of a dashboard, designing interactive dashboards, Using form controls and slicers, Linking charts and tables for dynamic updates.
Advanced Data Analysis Tools- What-If analysis: Scenario Manager, Goal Seek, Data Tables, Solver add-in for optimization problems, Using Power Query for data extraction and transformation, Integrating Excel with Other Tools-Linking Excel with databases, Exporting and importing data with other software (e.g., Access, SQL Server), Using Excel with cloud services (e.g., Google Sheets, Power BI).

Course Outcomes

A student will be able to

- Design and create interactive dashboards that effectively communicate complex data insights to stakeholders.
- Apply techniques like What-If analysis, optimization, and data transformation tasks using advanced Excel tools.
- Demonstrate the ability to import, export, and manipulate data across different platforms, improving data interoperability and workflow efficiency.
- Apply their understanding of dashboard design, advanced data analysis, and data integration to solve complex business challenges effectively.

Suggested Readings:

1. "Information Dashboard Design: Displaying Data for At-a-Glance Monitoring" by Stephen Few
2. "Excel 2019 Bible" by Michael Alexander and Richard Kusleika
3. "Power Pivot and Power BI: The Excel User's Guide to DAX, Power Query, Power BI & Power Pivot in Excel 2010-2016" by Rob Collie and Avichal Singh
4. "SQL Server 2019 Integration Services Cookbook" by Christian Cote, Matija Lah, Dejan Sarka, and David Dye.



23BCAI-N-305	Probability Theory	2L:0T:0P	2 Credits
--------------	--------------------	----------	-----------

Maximum Marks:100
External Examination: 80
Internal Assessment: 20

Course Objectives: The objective of the paper is to understand the application of Probability in real time problems.

Note: There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Students will have to attempt one question from each unit. Each question shall carry equal marks.

Unit 1:

Basic Probability: Random Experiments, Sample Space, Events, The Concept of Probability, The Axioms of Probability, Some Important Theorems On Probability, Assignment of Probability, Conditional Probability, Theorems On Conditional Probability, Independent Events, Bayes' Theorem.

Unit: 2

Random Variable and Probability Distribution: Random Variable, Discrete Probability Distribution, Distribution Functions for Random Variables, Distribution Functions for Discrete Random Variables, Continuous Random Variables, Graphical Interpretations, Joint Distributions, Independent Random Variables, Change of Variables

Unit:3

Mathematical Expectation: Definition of Mathematical Expectation, Functions of Random Variables, Some Theorem On Expectation, The Variance and Standard Deviation, Some Theorem in Variance, Standardized Random Variable, Moments, Moment Generating Factor, Some Theorem On Moment Generating Factor, Characteristics Functions, Variance of Joint Distribution-Covariance

Unit:4

Special Probability Distribution: The Binomial Distribution, Some Properties of Binomial Distribution, The Law of Large Number for Bernoulli Trials, The Normal Distribution, Some Properties of Normal Distribution, Relation Between Binomial and Normal Distribution, The Poisson Distribution, Some Properties of Poisson Distribution, Relation Between Binomial and Poisson Distribution, Relation Between Poisson and Normal Distribution.

Course outcomes (CO): On completion of the course, students should be able to:

CO1: Calculate the expectation and moments of random variables.

CO2: Identify the applications of various moment inequalities.

CO3: Explain the concept of convergence and check for the of convergence of a given sequences of random variables.

CO4: Find the expressions for the characteristic function of a random variable and verify its properties.

CO5: Apply the various laws of large numbers to sequences of random variables.

List of Recommended Books:

1. Cacoullos, T. (1989). Exercise in Probability, Springer-Verlag, New-York.
2. Feller W. (1968). Introduction to Probability Theory and Its Applications Vol. 1 and 2, John Wiley, New York.
3. Gnedenko, B.V. (1969). The Theory of Probability, Mir Publishers, Mosko.
4. Loeve, M. (1968). Probability Theory Allied East-West Press.
5. Mukhopadhyay, P. (2011). An Introduction to the Theory of Probability, World Scientific Publishing Company.

23BCAI-N - 307	Discrete Mathematics	3L:0T:0P	3 Credits
----------------	----------------------	----------	-----------

Maximum Marks:100
 External Examination: 80
 Internal Assessment: 20
 Max. Time: 3 Hrs

Course Objectives

- To provide students with a solid foundation in set theory, logic, inference, counting, relations, graph theory, algebraic structures, and computability theory, equipping them with the skills to solve complex mathematical problems and apply these concepts in computer science.

Note: There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Students will have to attempt one question from each unit. Each question shall carry equal marks.

Unit I

Sets & Logic: Sets - Visualizing sets, understanding membership, operations on sets (union, intersection, difference, complement). Algebra of sets and its laws, Mathematical Induction, Relations, Types of Relation- reflexive, symmetric, antisymmetric, Equivalence Relations
 Logic - Introduction to propositional logic, truth tables, Logical Operations, Conditional Statements

Unit II

Vectors & Matrix: Vectors - Operations, Column Vectors, Matrices - Matrix Addition, Matrix Multiplication, Transpose, Square Matrices and Algebra on Square Matrices, Inverse of Square Matrix
Functions & Algorithms: Functions as Relations, One-to-One, Onto and Invertible Functions, Mathematical, Exponential and Logarithmic Functions, Recursively Defined Functions (Examples like Factorial, Fibonacci), Algorithm and Functions - Polynomial Evaluation (Direct Method, Synthetic Division), Complexity of Algorithm - Best Case, Worst Case, Average Case

Unit III

Counting Techniques: Counting Principles - Sum Rule and Product Rule. Mathematical Functions - Factorial Function, Binomial Coefficients. Binomial Theorem - Binomial Coefficients and Pascal's Triangle. Permutations & Combinations - Understanding arrangements (permutations) and selections (combinations), using formulas for common scenarios. Tree Diagram

Unit IV

Graph - Graphs and Multigraphs, Degree of Vertex, Subgraphs, Isomorphic Graphs, Homeomorphic Graphs, Path, Connected Graph, Labeled Graph, Weighted Graph, Directed Graph, Undirected Graph, Complete Graphs, Regular Graphs, Bipartite Graphs, Planar Graph, Maps & Regions - Euler's Formula, Representing Graphs in Memory - Adjacency Matrix, Linked Representation of a Graph
Tree - Tree Graphs, Spanning Trees, Minimum Spanning Trees, Binary Trees, Representing Binary Trees in Memory - Linked & Sequential, Traversing Binary Tree, Binary Search Tree



Course Outcomes:

A student will be able to:

- Understand sets, sequences, matrices, and logical operations..
- Use statements, connectives, and normal forms in logic.
- Apply inference theories in statement and predicate calculus.
- Solve problems using permutations, combinations, and recurrence relations; manipulate relations and digraphs
- Understand graph theory concepts, Boolean algebras, and basic computability; explore semi-groups and groups.

Suggested Readings:

1. E. Goodaire , "Discrete Mathematics with Graph theory", PHI,. ISBN--10: 0131679953 2) J. K. Sharma, "Discrete Mathematics", McMillan, ISBN-9780230322301
2. J.P. Tremblay and R. Manohar, "Discrete Mathematical Structure with Applications to Computer Science", TMH, ISBN- 0-07-463113-6
3. Bernard Kolman, Robert C. Busby and Sharon Ross, "Discrete Mathematical Structure", PHI, ISBN- 978-81-203-3689-6
4. C. L. Liu, "Elements of Discrete Mathematics", TMH



23BCAL-N-308	Environmental Studies	2L:0T:0P	2 Credits
--------------	-----------------------	----------	-----------

Maximum Marks: 50
External Examination: 40
Internal Assessment: 10

Course Objectives: This course will provide the fundamental knowledge about environment and related issues that have direct impact on human population.

Note: *There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Students will have to attempt one question from each unit. Each question shall carry equal marks.*

Unit-I

Water Resources Management: coordinated development and management of water, land and related resources. Revival of Water Bodies: enumeration, protection and management of water bodies in their respective States. Energy & Green Technologies: Renewable and Alternative energies such as, Solar, Wind, Tidal etc.

Unit-II

Waste Management: Solid/Liquid/Plastic/C&D/Electronic/Bio-medical/Hazardous wastes. Sanitation & Hygiene: Methods Garbage collection, industrial/ hazardous waste management, Methods of wastewater treatment and disposal.

Unit-III

Environmental Laws & Policies and Legal Proceedings: Legislation, regulations, policies, and permits related to protecting the environment such as The National Green Tribunal Act, 2010, Water Prevention And Control of Pollution Act, 1974, Cess Act, 1974, Air Prevention And Control Of Pollution Act, 1977, Forest Conservation Act, 1980, Environmental Protection Act, 1986, Public Liability Insurance Act 1991, Government Missions for Environment Protection & Conservation (as per National Environment Policy NEP-2020) and Ministry of Environment and Forests (MoEF).

Unit-IV

Wildlife Protection & Conservation: habitat conservation, endangered and keystone species protection, ex-situ efforts, and poaching prevention. Environmental Impact Assessment: Water Environment, Biological Environment, Land Environment, Air Environment, Noise Environment, Socio-economic and Health Environment. Environment Management Plan.

Course outcomes (CO):

The students will understand the environmental challenges, realizing their role and motivated to protect the environment. These learning will prepare the students to develop their queries and ideas for a healthy environment.

CO1. Understanding the water resource management and the concept of green energy.

CO2. Understanding the different types of wastes and their management.

CO3. To develop awareness with the environmental laws and policies.

CO4. Understanding the wildlife protection and environmental impact assessment.

List of Recommended Books:

1. Fundamentals of Ecology: E. P. Odum, W.B. Saunders Co. USA
2. Concepts of Environmental Science (2017): Sugandha Mishra, Dharendra Kumar, Rajesh Publication, Delhi, India
3. Environmental Science (6th ed) (1997): Jr. G. T. Miller, Wadsworth Pub. Co
4. Fundamentals of Environmental Science: G. S. Dhaliwal, G. S. Sangha and P. K. Raina, Kalyani Publication
5. Environmental Science Systems & solutions, M.L. Mac-Kinney, & RM Schoch, Web-enhanced edition.
6. Environmental Chemistry: A. K. De, Wiley Eastern Ltd.

23BCAI-N-309	Lab-I (Based on Java Programming)	0L:0T:2P	1 Credits
--------------	-----------------------------------	----------	-----------

Maximum Marks:100
External Examination: 80
Internal Assessment: 20

Lab 1: Basics

- Write a Java program that prints "Hello, World!" to the console.
- Create a Java program that calculates the factorial of a given number using a loop.
- Develop a Java program to print the Fibonacci series up to a given limit.

Lab 2: Interface

- WAP to find the area of rectangle and circle using Interface.

Lab 3: OOPS

Create a class Film with string objects which stores name, language and lead_actor and category (action/drama/fiction/comedy). Also include an integer data member that stores the duration of the film. Include parameterized constructor, default constructor and accessory functions to film class. Film objects can be initialized either using a constructor or accessor functions. Create a class FilmMain that includes a main function. In the main function create a vector object that stores the information about the film as objects. Use the suitable methods of vector class to iterate the vector object to display the following • The English film(s) that has Arnold as its lead actor and that runs for shortest duration. • The Tamil film(s) with Rajini as lead actor. • All the comedy movies.

Lab 4: OOPS inheritance

Define an abstract class 'Themepark' and inherit 2 classes 'Queensland' and 'Wonderland' from the abstract class. In both the theme parks, the entrance fee for adults is Rs. 500 and for children it is Rs. 300. If a family buys 'n' adult tickets and 'm' children tickets, define a method in the abstract class to calculate the total cost. Also, declare an abstract method playGame() which must be redefined in the subclasses. In Queensland, there are a total of 30 games. Hence create a Boolean array named 'Games' of size 30 which initially stores false values for all the elements. If the player enters any game code that has already been played, a warning message should be displayed and the user should be asked for another choice. In Wonderla, there are a total of 40 different games. Thus create an integer array with 40 elements. Here, the games can be replayed, until the user wants to quit. Finally display the total count of games that were repeated and count of the games which were not played at all.

Lab 5: Inheritance

Define a superclass Shape with an abstract method calculateArea(). Implement subclasses Circle and Rectangle that inherit from Shape and override the calculateArea() method to calculate the area specific to each shape. Create objects of both subclasses and demonstrate polymorphism.

Lab 6: Exception Handling

Read the Register Number and Mobile Number of a student. If the Register Number does not contain exactly 9 characters or if the Mobile Number does not contain exactly 10 characters, throw an IllegalArgumentException. If the Mobile Number contains any character other than a digit, raise a NumberFormatException. If the Register Number

contains any character other than digits and alphabets, throw a NoSuchElementException. If they are valid, print the message 'valid' else 'invalid'.

Lab 7: Package

Write a program to demonstrate the knowledge of students in working with user-defined packages and sub-packages. Eg., Within the package named 'primespackage', define a class Primes which includes a method check For Prime() for checking if the given number is prime or not. Define another class named Twin Primes outside of this package which will display all the pairs of prime numbers whose difference is 2. (Eg, within the range 1 to 10, all possible twin prime numbers are (3,5), (5,7)). The Twin Primes class should make use of the checkForPrime() method in the Primes class.

Lab 8: File Handling

Write a program to demonstrate the knowledge of students in File handling. Eg., Define a class 'Donor' to store the below mentioned details of a blood donor. Name, age, Address, Contactnumber, bloodgroup, date of last donation Create 'n' objects of this class for all the regular donors at Vellore. Write these objects to a file. Read these objects from the file and display only those donors' details whose blood group is 'A+ve' and had not donated for the recent six months.

Lab 9: AWT

- Write AWT program in Java to find the sum, Multiplication and average of three numbers entered in three Text fields by clicking the corresponding Labeled Button. The result should be appearing in fourth text field.
- Write Java Program to generate Even numbers and Odd Numbers in TextField "T1 and T2 respectively" while pressing Button "Even" and "Odd".



23BCAI-N-310	Lab-II (Based on Data Analysis using Excel)	0L:0T:2P	1 Credit
--------------	---	----------	----------

Maximum Marks:100
External Examination: 80
Internal Assessment: 20

Practical1: Data Entry and Data Cleaning

- **Task:** Create a sample dataset with 10 rows and 5 columns.
- **Steps:**
 1. Enter data into the spreadsheet.
 2. Use Excel's data cleaning tools to remove duplicates, handle missing values, and format data.

Practical 2: Sorting and Filtering Data

- **Task:** Sort and filter a dataset to analyze specific data subsets.
- **Steps:**
 1. Sort data by different columns.
 2. Apply filters to display specific data subsets based on criteria.

Practical 3: Using Formulas and Functions

- **Task:** Apply basic and conditional functions to a dataset.
- **Steps:**
 1. Use basic functions like SUM, AVERAGE, MIN, and MAX.
 2. Apply conditional functions such as IF, COUNTIF, and SUMIF.

Practical 4: Data Validation

- **Task:** Implement data validation rules to ensure accurate data entry.
- **Steps:**
 1. Create drop-down lists.
 2. Set validation rules for data entry to ensure data integrity.

Practical 5: Conditional Formatting

- **Task:** Use conditional formatting to highlight data based on specific criteria.
- **Steps:**
 1. Highlight cells based on specific criteria.
 2. Use color scales, data bars, and icon sets for visual representation.

Practical 6: Creating and Formatting Tables

- **Task:** Convert data ranges into tables and apply table styles.
- **Steps:**
 1. Convert a range of data into an Excel table.
 2. Apply different table styles and properties for better readability.

Practical 7: Charts and Graphs

- **Task:** Visualize data by creating various types of charts.
- **Steps:**
 1. Create bar, line, and pie charts.
 2. Customize chart elements such as titles, labels, and legends.

Practical 8: Pivot Tables

- **Task:** Summarize and analyze large datasets using pivot tables.
 - **Steps:**
 1. Create pivot tables from large datasets.
 2. Analyze data by rearranging fields in the pivot table.
-

Practical 9: Pivot Charts

- **Task:** Create and customize pivot charts to visualize pivot table data.
- **Steps:**
 1. Create pivot charts from pivot tables.
 2. Customize pivot chart elements for clarity.

Practical 10: VLOOKUP and HLOOKUP Functions

- **Task:** Retrieve data using VLOOKUP and HLOOKUP functions.
- **Steps:**
 1. Use VLOOKUP to find data in vertical columns.
 2. Use HLOOKUP to find data in horizontal rows.

Practical 11: Text Functions

- **Task:** Clean and manipulate text data using text functions.
- **Steps:**
 1. Use functions like LEFT, RIGHT, MID, and CONCATENATE.
 2. Clean and format text data as required.

Practical 12: Date and Time Functions

- **Task:** Perform calculations with date and time data.
- **Steps:**
 1. Use functions like TODAY, NOW, DATE, and TIME.
 2. Calculate differences between dates and times.

