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Reg. No: 21BCA0223

VIT
Vellore Institute of Technology

Final Assessment Test – November 2025

Course: UBCA203L - Programming in Java
Class NBR(s): 2826 Slot: D2+TD2
Time: Three Hours Max. Marks: 100

- KEEPING MOBILE PHONE/ANY ELECTRONIC GADGETS, EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE
- DON'T WRITE ANYTHING ON THE QUESTION PAPER

COs	CO Statements
CO1	Provide a basic understanding and solving the computational problems using Java programming.
CO2	Handle object oriented concepts and run-time errors.
CO3	Execute collection framework, multi-processes using threads and handle file.
CO4	Design interactive GUI applications using JavaFX.
CO5	Create database programs to perform CRUD operations.

BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)

Answer ALL Questions
(10 X 10 = 100 Marks)

1. A university is planning to teach students programming by allowing them to run Java programs on different types of computers (Windows labs, Mac systems of faculty, and Linux servers in the cloud). The concern is how the same Java program can run consistently across these platforms and how memory is managed efficiently during execution. With reference to this scenario, explain the architecture of the Java Virtual Machine (JVM) and discuss how it ensures platform independence and efficient memory management during program execution. **CO1 BL1**

2. A bank ATM allows a user to enter a PIN number. The user has 3 attempts to enter the correct PIN. If the user enters it correctly, display "Access Granted". If not, after 3 failed attempts, display "Card Blocked". Write a Java program using a loop to implement the ATM PIN verification system. **CO1 BL2**

3. Develop a Java program using the 2D array concept. **CO1 BL3**
   a) Accepts a square matrix from the user.
   b) Prints the matrix.
   c) Calculates and prints the sum of the main diagonal elements.
   d) Checks whether the matrix is a sparse matrix (i.e., contains more zero elements than non-zero elements) and prints an appropriate message.

4. Write a Java program that can store, manage, and process employee data using an array of Employee objects. Each employee contains the details such as empId (int), name (String), department (String) and salary (double). Create an Employee class with methods like acceptDetails(), displayDetails() and highestSalaryEmployee(). Accept details of 'n' employees and store them in an array of Employee objects. Display details of all employees. Display employees with a salary greater than a specified amount. CO2 BL3

5. An educational institute offers different types of courses: Online Courses, Offline Courses, and Hybrid Courses. Create a base class "Course" containing common details like course name, course code, and duration. Create three derived classes (OnlineCourse, OfflineCourse, HybridCourse) that extend Course and store their unique attributes are given below: CO2 BL4

- OnlineCourse: platform name (e.g., Coursera, Udemy) and video access duration in days.
- OfflineCourse: classroom location and maximum number of students allowed.
- HybridCourse: platform name, classroom location, and number of in-person sessions.

Demonstrate hierarchical inheritance by creating objects for each course type, storing sample data, and displaying complete details. Ensure input is taken from the user for all details.

6. An online food delivery system needs to handle multiple tasks at the same time: CO3 BL4

- Order Placement: When a customer places an order, the system should accept the order.
- Order Preparation: Once the order is accepted, the restaurant starts preparing the food.
- Order Delivery: After preparation, a delivery person is assigned to deliver the order.

Since these tasks can happen concurrently for multiple customers, the system wants to use Java threads to simulate the process. Write a Java program using multithreading where One thread handles order placement, another thread handles order preparation, and another thread handles order delivery. Make sure the threads run in proper sequence for each customer.

7. A hospital wants to organize its system using packages. A package hospital.patients containing a class Patient with attributes like patientId, name, and disease. Method: displayPatientDetails(). A package hospital.doctors CO3 BL3

containing a class Doctor with attributes like doctorId, name, and specialization. Method: displayDoctorDetails(). A package hospital.appointments containing a class Appointment that connects a Doctor and a Patient. Method: displayAppointmentDetails(). A main class HospitalApp (outside the packages) that:

- Creates a doctor and a patient.
- Books an appointment.
- Displays full appointment details.

8. A supermarket wants to develop a system to manage its product inventory using the Java Collection Framework. The supermarket keeps track of all available products. CO3 BL4

Each product contains details such as productId (int), name (String) and price (double). Create a Java program using an ArrayList to perform the following operations:

a) Add products to the list.
b) Display all products using a loop.
c) Update the price of a product.
d) Search for a product by name.
e) Remove a product by name or id.
f) Display the total number of products.
g) Sort the products by price.
h) Check if the list is empty and clear all products.

9.a) The examination department wants to analyze the performance of students based on their exam scores. The raw data contains several marks, some of which are repeated and include failing scores (below 50). Before generating the final report, the department wants to process the data and perform a few cleaning and transformation steps. Develop a Java program using the Stream API to process the exam scores efficiently. Use Stream.of() to create a stream of integer scores and perform the following operations sequentially: CO4 B

(i) Keep only the scores greater than or equal to 50.
(ii) Increase each passing score by 5 marks.
(iii) Remove any duplicate scores.
(iv) Sort the scores in ascending order.
(v) Collect the results into a List<Integer> and use forEach() to print each final score.

OR

9.b) Create a JavaFX application to calculate simple interest. Add three text fields to enter Principal (P), Rate of Interest (R) and Time (T). A button labeled "Calculate Interest". When the button is clicked, calculate simple interest using the formula: SI = (P * R * T) / 100. Show the calculated interest in a Label. **CO4 BL6**

10.a) Consider the following "Movie Collection" database table: **CO5 BL6**

Movie Name	Year Released	Director
Inception	2010	Christopher Nolan
Avatar	2009	James Cameron
The Godfather	1972	Francis Ford Coppola
Titanic	1997	James Cameron

Develop a Java program that connects to a Mysql database and performs the following operations:

(i) Insert a new record as "Interstellar, 2014, Christopher Nolan" into the Movie Collection table.

(ii) Display the details of movies directed by James Cameron.

(iii) Delete the movies released before 2000.

OR

10.b) Consider the following "Car Inventory" database table: **CO5 BL6**

Car Model	Year	Manufacturer
Civic	2018	Honda
Corolla	2015	Toyota
Mustang	2020	Ford
Fiesta	2012	Ford

Develop a Java program that connects to a Mysql database and performs the following operations:

(i) Insert a new record as "Camry, 2021, Toyota" into the Car Inventory table.

(ii) Display the details of cars manufactured by Ford.

(iii) Delete the cars manufactured before 2015.

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