

**VIT**

Vellore Institute of Technology

REG.NO.:

SCHOOL OF COMPUTER SCIENCE ENGINEERING AND INFORMATION SYSTEMS
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2025-2026

SLOT: E1+TE1

Programme Name & Branch : MCA
Course Code and Course Name : Java Programming – PAMCA502
Faculty Name(s) : Prof. Shynu P G, Prof. Senthil Murugan B
Class Number(s) : VL2025260106032, VL2025260106024
Date of Examination : 09-Oct-2025
Exam Duration : 90 minutes

Maximum Marks: 50**General instruction(s):**

- Answer All Questions
- M - Max mark; CO - Course Outcome; BL - Bloom's Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)
- **Course Outcomes:**
CO2: Develop multithreaded and exception-handling features in Java programs
CO3: Build GUI-based database applications using JavaFX and JDBC.
CO4: Create web applications using Spring Boot and Hibernate.

Q. No	Question	M	CO	BL
1.	You are building a collection of utility functions and notice that you have written almost identical code to swap two elements in an array for different data types (e.g., one for Integer[], one for String[]). This is repetitive and inefficient to maintain. Write a single, reusable generic method named swapElements that can swap any two elements at given indices in an array of any object type. Demonstrate that your method works correctly on both an Integer array and a String array. A colleague tries to use your new, efficient method to swap two numbers in a primitive int[] array, but the code fails to compile. Analyze this failure. Explain the fundamental reason why Java's generic methods can operate on an array of Integer objects but not on an array of int primitives.	10	3	3
2.	You are a system administrator analyzing a large application log file (applicationlog.txt) to find critical errors. The file contains thousands of informational and warning messages, making it hard to spot the real problems. Write a complete Java program that reads applicationlog.txt. The program must find all lines that contain the word "ERROR" and write only those specific lines to a new, clean file named error_report.txt applicationLog.txt (sample): 2025-09-29 19:11:15 INFO: User 'alice' logged in successfully. 2025-09-29 19:12:06 ERROR: Payment gateway timeout for order #A48DE2. 2025-09-29 19:13:30 WARN: Disk space is running low. 2025-09-29 19:14:00 ERROR: java.lang.NullPointerException at 2025-09-29 19:15:30 INFO: Server health check passed.	10	2	3
3.	You are creating the backend for a "Job Application" form. An HTML form will submit the candidate's fullName, email, and age. Create an HttpServlet that processes this data. Your servlet must perform robust server-side validation by checking if the value received for age is a valid integer. If it is, display a success page confirming the candidate's details. If the age is not a valid integer (e.g., the user entered "twenty-five"), the servlet must respond with a user-	10	4	3

	friendly error page and not crash. A teammate argues that server-side validation is an unnecessary extra step, claiming that "we can just use JavaScript in the browser to make sure the user only enters numbers." Analyze this argument. Explain why relying solely on client-side (JavaScript) validation presents a significant security vulnerability for a web application.			
4.	You are building a utility to manage product data in a database. Assume a Products table exists with columns: product_id (INTEGER), product_name (VARCHAR), and price (DECIMAL). Write a Java class that provides the following three secure JDBC methods: <ul style="list-style-type: none"> • addProduct(int id, String name, double price) • updateProductPrice(int id, double newPrice) • deleteProduct(int id) In your main method, demonstrate a product's full lifecycle by calling these methods in sequence: first add a product, then update its price, and finally, delete it. Suppose you needed to execute a series of database changes (e.g., deleting an old product and adding its replacement) as a single, all-or-nothing operation. What JDBC feature would you use? Briefly describe its purpose.	10	3	3
5.	You are developing a collaborative playlist application. Multiple users (represented by threads) will concurrently add their favorite songs to a single, shared playlist. The playlist is stored in a standard, unsynchronized ArrayList. Write a Java program where two threads concurrently add 100,000 songs each to the same ArrayList. After both threads finish, print the final size of the list. The final size of the ArrayList is likely less than the expected 200,000, and the program might even crash with an ArrayIndexOutOfBoundsException. Analyze this outcome. Explain why a standard ArrayList is not thread-safe. Describe how the internal "add" operation can fail when accessed by multiple threads at once, leading to data loss or corruption.	10	2	3



SCHOOL OF COMPUTER SCIENCE ENGINEERING AND INFORMATION SYSTEMS
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2025-2026

SLOT: D1+TD1

Programme Name & Branch	: MCA
Course Code and Course Name	: PAMCA501 – DATA STRUCTURES AND ALGORITHMS
Faculty Name(s)	: Dr.M.Ramalingam & Dr.E.P.Ephzibah
Class Number(s)	: 6014, 6018
Date of Examination	: 08.10.2025
Exam Duration	Maximum Marks: 50

General instruction(s):

- Answer All Questions
- M - Max mark; CO - Course Outcome; BL - Blooms Taxonomy Level (1 - Remember, 2 - Understand, 3 - Apply, 4 - Analyse, 5 - Evaluate, 6 - Create)
- Course Outcomes (Type the CO statements covered in this question paper. Use the CO number as per the syllabus copy)

CO3: Design optimal solutions using graph-based data structures

Q. No	Question	M	CO	BL
1	<p>Given the expression: $A + B * C - D / E - F / G / H$.</p> <p>(a) Build the expression tree for the given expression. (b) Give the preorder and postorder traversals of the tree constructed.</p>	10	3	3
2	<p>Construct an AVL Tree by performing the following operations step by step: Insert the keys in the order: 30, 20, 40, 10, 25, 35, 50, 5, 38, 36 After each insertion, show the tree structure and indicate any rotations performed to maintain the AVL property.</p> <ul style="list-style-type: none">• After constructing the AVL Tree, delete the leaf node key 5. Show the tree after rebalancing (if required).• Next, delete the internal node key 40. Show the step-by-step rebalancing using appropriate AVL rotations.• Next, delete the key 30. Show the step-by-step rebalancing using appropriate AVL rotations	10	3	3
3.	<p>Consider a B-Tree of order 3. Perform the following operations step by step:</p> <ul style="list-style-type: none">• Insert the keys in the order:• 10, 20, 5, 6, 12, 30, 7, 17, 15<ul style="list-style-type: none">◦ Show the resulting B-Tree after each insertion, clearly indicating any node splits that occur.• After the B-Tree is constructed, delete the leaf node key 5. Show the tree structure after rebalancing (if required).• Next, delete the internal node key 6. Use the standard B-Tree deletion algorithm, and show the final B-Tree.	10	3	3

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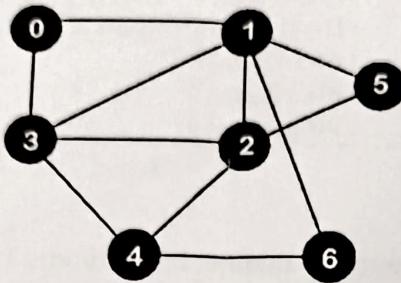
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CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2025-2026

SLOT: D1+TD1

4



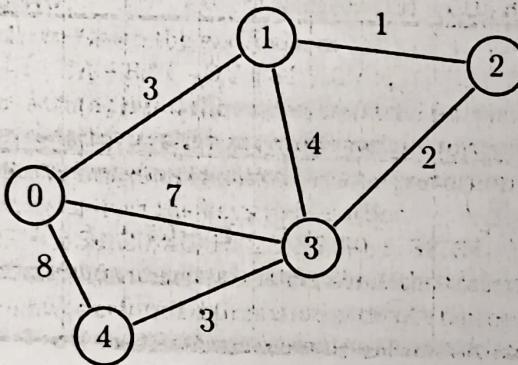
10 3 3

Consider the above undirected graph.

Apply Depth First Search starting from vertex 0, and mention the order of traversal.
Show step by step pictorially (5)

Apply Breadth First Search starting from vertex 0, and mention the order of traversal.
Show step by step pictorially (5)

5



10 3 3

Consider the above weighted graph and derive the minimum spanning tree using Prim's Algorithm and show the edges chosen.



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CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2025-2026**

SLOT: C1+TC1+ TCC1

Programme Name & Branch	: MCA - Computer Applications
Course Code and Course Name	: PAMCA601 & Cloud Computing
Faculty Name(s)	: Dr.Daphne Lopez & Dr.E.Sathiyamoorthy
Class Number(s)	: VL2025260106368, VL2025260106367
Date of Examination	: 7/10/2025
Exam Duration	: 90 minutes
Maximum Marks: 50	

General instruction(s):

- Answer All Questions
- Course Outcomes
 - Design scalable and resilient cloud infrastructures with modern techniques.
 - Implement cloud-native applications using DevOps and container orchestration.

Q. No	Question	M	CO	BL
1.	A large electronics retailer experiences heavy user traffic, generating large volumes of server log files daily. The company decides to detect error patterns in real time to improve system reliability. With a neat architecture explain how ResourceManager and NodeManager efficiently manage the resources during high volume log processing.	10	2	2
2.	Detail on the Hadoop cluster and HDFS architecture that stores data for a healthcare company that has branches across India. Outline the stages of MapReduce for the same for any health analytics application of your choice.	10	3	1
3.	Compare Spine-Leaf Datacentre topology with traditional datacentres. A large cloud provider could deploy 32 leaf switches and 8 spine switches, connecting 5000 servers with 100Gbps. How does this architecture support large-scale virtualization, improve performance and reduce latency?	10	2	3
4.	With an illustration of your choice elaborate the microservices architecture, advantages, disadvantages and the functioning for an application that requires a complex data pipeline-oriented architecture, where each stage is managed by one (or a few) particular task, e.g. data collection, processing, delivery, storage etc.	10	3	2
5.	A mid-sized e-commerce company currently running a monolithic Java application on VMs. Peak traffic is highly spiky during festival sales. The company wants faster feature releases, better scalability for checkout and recommendation features, and lower operational overhead. Management requires a migration to Containerization approach with Dockers and Kubernetes, plus a DevOps culture with automated CI/CD, observability, and safe deployment practices. You are the lead cloud engineer. Design a solution that integrates all the above approach.	10	3	3



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SLOT: A1 + TA1 + TAA1

**SCHOOL OF ADVANCED SCIENCES
DEPARTMENT OF MATHEMATICS
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER - 2025~2026**

Programme Name & Branch : MCA- Master of Computer Application
Course Code & Course Name : PAMAT501 & Probability and Statistics
Faculty Name(s) & Class Number(s) : Common Question Paper
Date of Examination and Session : 05-10-2025 & AN Session
Exam Duration : 90 Minutes

Maximum Marks : 50 M

General Instruction(s):

- Answer All Questions.
- M – Max. Marks; CO – Course Outcome; BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create).
- Course Outcomes: CO-2: Select and apply suitable probability distributions for practical and experimental scenarios, CO-3: Interpret relationships among variables using correlation and regression analysis. CO-4: Perform statistical hypothesis tests using large sample techniques.
- Students are permitted to carry any number of text books and hand written class note books.

Q. No.	Questions	M	CO	BL																		
1.	<p>The weights of packets of sugar are normally distributed with mean $\mu = 1$ kg and standard deviation $\sigma = 0.05$ kg.</p> <p>(i). Find the percentage of packets weighing less than 0.9 kg.</p> <p>(ii). Find the percentage of packets weighing between 0.95 kg and 1.05 kg.</p> <p>(iii). If packets weighing more than 1.1 kg are considered overfilled, find the proportion of overfilled packets.</p>	10	2	3																		
2.	<p>An experiment measured runtime (ms) of an algorithm for various input sizes (in thousands). Let X = input size (thousands), Y = runtime (ms).</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Run</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr> <td>X (thousands)</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr> <td>Y (ms)</td><td>2</td><td>3</td><td>5</td><td>7</td><td>11</td></tr> </table> <p>then (i). find the equation of the line of regression of Y on X, (ii). find the equation of the line of regression of X on Y and (iii). correlation coefficient between X and Y.</p>	Run	1	2	3	4	5	X (thousands)	1	2	3	4	5	Y (ms)	2	3	5	7	11	10	3	2
Run	1	2	3	4	5																	
X (thousands)	1	2	3	4	5																	
Y (ms)	2	3	5	7	11																	

Q. No.	Questions	M	CO	BL
3.	<p>A financial analyst is studying the performance of a certain stock (X_1) based on two market indicators: the company's Price-to-Earnings ratio (X_2) and the overall market volatility (X_3). The simple (zero-order) correlation coefficients are given as $r_{12} = 0.90$ (Stock Price vs. P/E Ratio), $r_{13} = -0.50$ (Stock Price vs. Market Volatility) and $r_{23} = -0.60$ (P/E Ratio vs. Market Volatility). Calculate all partial correlation coefficients ($r_{12.3}$, $r_{13.2}$, $r_{23.1}$) and the multiple correlation coefficients ($R_{1.23}$ & $R_{2.31}$).</p>	10	3	2
4.	<p>A company is testing two different designs for a new product package, Design A and Design B, in two separate markets.</p> <ul style="list-style-type: none"> • Market X (Design A): A random sample of $n_1 = 450$ customers was surveyed. $x_1 = 306$ customers stated they preferred Design A. • Market Y (Design B): A random sample of $n_2 = 550$ customers was surveyed. $x_2 = 330$ customers stated they preferred Design B. <p>Is there a significant difference in the true proportion of consumers who prefer Design A versus Design B? .</p>	10	4	3
5.	<p>A coffee company advertises that its bags of coffee have a net weight of 1.0 kg. A quality control manager suspects the machine is underfilling the bags. To test this, she selects a random sample of bags with sample size $n = 49$ bags, sample mean weight $\bar{x} = 0.98$ kg and population standard deviation $\sigma = 0.05$ kg. Can the manager reasonably conclude that the true mean weight (μ) of the coffee bags is less than 1.0 kg? Test this at a 5% level of significance ($\alpha = 0.05$).</p>	10	4	3

Slot :TF1

School of Computer Science Engineering and Information Systems
Continuous Assessment Test – II
Fall Semester 2025-2026

Programme Name & Branch: Technical report Writing

Course Name & code: PAENG501

Class Number (s): VL2025260105648, VL2025260106500, VL2025260105652

Faculty Name (s): Dr. Rukmini. S, Dr. Sangeeta Mukherjee, Dr. Denish Raja Durai K.

Exam Duration: 90 Minutes.

Maximum Marks: 50

General instruction(s):

Answer All Questions

M - Max marks; CO – Course Outcome; BL – Blooms Taxonomy Level (1 – Remember, 2 –

Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)

Course Outcomes

CO1: Apply the principles of effective report writing.

CO2: Demonstrate the ability to draft and present technical reports.

CO3: Produce key components of technical documents, including sections focusing on purpose, audience, and structure, through writing assignments.

Q.No.	Question	Max Marks	CO	BL
1.	<p>Write a conclusion and recommendation for the above case study</p> <p>Sarah, a senior software engineer at TechX Innovations, is experiencing increasing difficulty balancing her work responsibilities and personal life. Her job requires her to manage multiple projects, collaborate with cross-functional teams, and provide mentorship to junior developers. Due to the nature of the job, long hours, weekend work, and constant project deadlines are becoming the norm. As a result, Sarah has started to feel burnout creeping in. While she enjoys the technical challenges of her role, the excessive hours are taking a toll on her physical and mental health. She is also noticing that her relationships with her family and friends are suffering due to her inability to dedicate quality time outside of work.</p>	10	CO3	BL2
2.	Write a relevant and brief introduction for the following topic, 'The necessity to discuss AI Ethics in Education'.	10	CO2	BL2
3.	Draft a report in a letter format for the given situation.	10	CO3	BL2

	Krishna has taken an education loan of Rs 15,00,000/- for his son from the Indian Bank. He needs to clear the loan in 5 years. He paid EMI on time for 4 years but couldn't continue till the end and clear the loan. Imagine you are Krishna's father. Draft a report to the bank manager explaining the situation and asking him for any further helplines.			
4.	Punctuate the following. A common case study in environmental ethics involves balancing economic development with environmental protection such as a corporation building a factory that creates jobs but pollutes local water sources and destroys habitats. Other case studies explore complex issues like managing resource use animal rights and the impact of chemical pollution on human health often using a structured approach that identifies stakeholders, facts, values, consequences and potential solutions to promote ethical decision-making in environmental matters.	10	CO1	BL2
5.	a) Identify the clichés in the sentences given below and replace it with a suitable phrase- 1. At the end of the day it is diagnosed that she is suffering from chronic disease. 2. It is important to note that the project has been postponed indefinitely 3. It is widely accepted that all is well that ends well. 4. On the other hand it is very risky 5. It is a game changer in research. b) . Identify the redundancy of words in each sentence 1. I think it is adequate enough 2. Can help me to merge together the documents. 3. Please share your past experiences to the psychologist for further diagnosis. 4. The reason why I couldn't attend the meeting is I couldn't get the bus on time. 5. Let us collaborate together and finish the project.	5marks	CO1	BL2



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CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2025-2026

SLOT: B1+TB1

Programme Name & Branch	:	MCA
Course Code and Course Name	:	PAMCA503 - Database Management Systems
Faculty Name(s)	:	Dr. BIMAL KUMAR RAY, Dr. JAYARAM REDDY A
Class Number(s)	:	VL2025260106036, VL2025260106041
Date of Examination	:	06-Oct-2025
Exam Duration	:	90 minutes
		Maximum Marks: 50

General instruction(s):

- Answer All Questions
- M - Max mark; CO – Course Outcome; BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)

COs	CO Statements
CO2	Apply relational algebra and normalization techniques for schema optimization.
CO3	Develop complex queries using SQL and PL/SQL for data manipulation.
CO4	Implement transaction and concurrency control strategies.

Q. No	Question	M	CO	BL
1.	Consider a relation schema R(A, B, C, D, E, G, H) and let $F = \{EG \rightarrow AB, E \rightarrow CD, CD \rightarrow AB, D \rightarrow H, CD \rightarrow G\}$ be a set of functional dependencies defined on the schema R. Find out a minimal cover of F.	10	2	2
2.	Consider the following relational database schema relating to candidates appearing in competitive examinations. The primary keys are underlined and the foreign keys are self-explanatory. CANDIDATE(Roll_no, Name, Address, Highest_qualification) WRITES(Roll_no, Exam_name, Marks) EXAMINATION(Exam_name, Essential_qualification, Exam_date, Cut_off_marks) . Translate each of the following statements into an SQL statement. (i) Retrieve the name of the examination, and the name and roll number of the candidates who secured marks higher than the cut off marks. (2) (ii) Retrieve the name of the graduate candidates who appeared in GRE and Civil Service examination held after December 31, 2022. (2) (iii) Retrieve the name, address and the highest qualification of the candidates who appeared in Banking Service examination held after November 30, 2023, in alphabetic order of their name and address. (2) (iv) Retrieve the name and address of the candidates who wrote Civil Service examination and those who did not write Civil Service examination. (2) (v) Retrieve the name of the competitive examination and the number of candidates who appeared in the examination. (2)	10	3	3
3.	Consider the relational database schema: CANDIDATE(Roll_no, Name, Address, Highest_qualification) WRITES(Roll_no, Exam_name, Marks) EXAMINATION(Exam_name, Essential_qualification, Exam_date, Cut_off_marks) . (a) Write a PL/SQL procedure to display the name of a candidate and her/his grade	10	3	6



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SLOT: B1+TB1

	computed based on the marks secured by her/him following the rules: if the marks is greater than 80 then the grade is A, if it is between 70 and 80 then the grade is B, if it is between 60 and 70 then the grade is C, otherwise no grade is awarded. (5) (b) Find out the best evaluation plan of the following query using heuristic optimization. <i>Display the name of the examination and the name and the roll number of the candidates who secured marks higher than the cut-off marks in the examinations held after August 31, 2021.</i> (5)							
4.	(a) Consider the following database table pertaining to the information about students and the course that they have taken (one student can take multiple courses). The primary key is underlined. <table border="1"><tr><td><u>Reg_no</u></td><td>Name</td><td>Email</td><td>Course code</td></tr></table> (i) If the table remains sorted with respect to the <i>name</i> column then what kind of index can be created on this column of the table? Is this a dense/sparse index? Justify your answer. (ii) If the table remains sorted with respect to the <i>name</i> column then what kind of index can be created based on the <i>email</i> column of the table? Is this a dense/sparse index? Justify your answer. (b) Consider the relational database schema CANDIDATE(<u>Roll_no</u> , Name, Address, Highest_qualification) WRITES (<u>Roll_no</u> , Exam_name, Marks) EXAMINATION(Exam_name, Essential_qualification, Exam_date, Cut_off_marks). Mention the indexes that should be created based on the following queries. (6) (i) Retrieve the name of the examination, and the name and roll number of the candidates who secured marks higher than 75. (ii) Retrieve the name of the graduate candidates who appeared in GRE and Civil Service examination held after December 31, 2022. (iii) Retrieve the name, address and the highest qualification of the candidates who appeared in Civil Service examination held after November 30, 2023.	<u>Reg_no</u>	Name	Email	Course code	4	2	10
<u>Reg_no</u>	Name	Email	Course code					
5.	Write down the pairs of conflicting operations present in the following schedule and draw the precedence (serialization) graph. $r_1(X); w_2(Y); w_3(X); w_2(Y); w_2(X); w_3(Y); r_1(X); r_3(Y); r_3(X); r_1(Y); w_1(Y).$ Write down all pairs of conflicting operations present in the schedule. Determine whether the schedule is conflict serializable; citing reason for the same. If the schedule is conflict serializable then write down an equivalent serial schedule. If the schedule is not conflict serializable then propose a serial schedule (not equivalent, but a possible serial ordering of the three transactions).	4	2	10				
