



# VIT

Vellore Institute of Technology

SCHOOL OF COMPUTER SCIENCE ENGINEERING AND INFORMATION SYSTEMS  
CAT-2  
WINTER SEMESTER(WEI) 2025-2026

SLOT: E2+TE2

Programme Name & Branch : BTECH - Information Technology  
Course Code and Course Name : BAITE103 - Principles of Software Engineering  
Faculty Name(s) : BHAVANI S, GAYATHRI A, FELICITA S A M  
Class Number(s) : VL2025260503155, VL2025260503164, VL2025260503172  
Date of Examination : 20.03.2026  
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)
- Course Outcomes (Type the CO statements covered in this question paper. Use the CO number as per the syllabus copy)  
CO3. Model systems with UML and apply architectural styles  
CO4. Implement testing methods to ensure software quality and reliability

| Q. No | Question                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | M  | CO | BL |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|
| 1.    | <p>A hospital provides an online patient consultation and medical report management system that allows patients to book appointments and receive diagnostic reports through a hospital portal. When a patient accesses the hospital website, the patient must first register or log in using their patient ID and password. The system verifies the patient details from the hospital database.</p> <p>After successful authentication, the patient searches for doctors based on department or specialization and views the available appointment slots. Each doctor can consult only a limited number of patients per day, so the system checks the availability of slots before confirming the appointment. If an appointment slot is available, the patient selects the date and time and proceeds with online payment. After successful payment, the appointment is confirmed and the system sends a notification message to the patient. During the consultation, the doctor may recommend diagnostic laboratory tests. The patient's test request is then processed through several stages in the hospital laboratory system. The system first collects the test request, then validates patient and test details, retrieves the patient's medical history, processes the laboratory test data, analyzes the results, and finally generates a diagnostic report. The report is stored in the hospital database and made available to both the doctor and patient through the hospital portal. Patients can later log in to the system at any time to view or download their medical reports.</p> <p>a) Draw an Activity Diagram representing the workflow of the hospital system from patient login to appointment booking and report generation. (5 marks)</p> <p>b) Draw a Sequence Diagram showing the interaction between them. (5 marks)</p> | 10 | 3  | 3  |
| 2.    | Design a suitable software architectural pattern for the scenario given in question 1 to represent the processing stages involved in laboratory test report generation. Clearly show the processing stages and explain how data flows between them.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 10 | 3  | 4  |
| 3.    | Identify the type of coupling and cohesion for the following scenarios and justify your answers. Suggest necessary improvements that could be made to increase cohesion and reduce coupling.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 5  | 3  | 4  |
|       | a) A banking system has two modules: Account Update updates account balance. Report Generator reads the same global balance variable to                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |    |    |    |

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|                                                                                                                                                                                                                                  | <p>generate reports. (5 marks)</p> <p>b) A module Process Order (orderID, quantity) sends only the required values to another module Price Calculator to compute the total price of the order. The receiving module uses only these values to perform the calculation and returns the computed price. (5 marks)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                  |                                                                                                                                                                                                |    |   |   |
| 4.                                                                                                                                                                                                                               | <p>A bank provides an online personal loan application system where customers can apply for a loan through the bank's website. During the application process, the applicant must enter their monthly income.</p> <p>The bank has defined the following rules for loan eligibility:</p> <ul style="list-style-type: none"><li>• The minimum monthly income required to apply for the loan is ₹10,000.</li><li>• The maximum income considered for this loan scheme is ₹200,000 per month.</li><li>• If the income is less than ₹10,000, the system should display "Income below eligibility criteria."</li><li>• If the income is greater than ₹200,000, the system should display "Income exceeds allowed limit for this loan scheme."</li><li>• The system should accept only numeric values for income.</li><li>• If the user enters alphabetic characters or special symbols, the system should display "Invalid income format."</li><li>• If the income field is left blank, the system should display "Income cannot be empty."</li></ul> <p>If the income value satisfies all conditions, the system proceeds to the next stage of loan processing and document verification</p> <p>a) Identify and classify the valid and invalid equivalence partitions for the input parameter Monthly Income. (5 marks)</p> <p>b) Determine the boundary test values for the income parameter and Design test cases with input values and expected outputs to verify the correct functioning of the system. (5 marks)</p> | 10                                                                                                                                                                                                                               | 4                                                                                                                                                                                              | 5  |   |   |
| 5.                                                                                                                                                                                                                               | <p>Consider the following pseudo-code which determines whether a given number is an Armstrong number</p> <table><tr><td><p>1. START</p><p>2. INPUT number</p><p>3. original ← number</p><p>4. sum ← 0</p><p>5. WHILE number &gt; 0 DO</p><p>6.     digit ← number MOD 10</p><p>7.     sum ← sum + digit^3</p><p>8.     number ← number DIV 10</p></td><td><p>9. END WHILE</p><p>10. IF sum = original THEN</p><p>11.     PRINT "Armstrong Number"</p><p>12. ELSE</p><p>13.     PRINT "Not an Armstrong Number"</p><p>13. END IF</p><p>14. STOP</p></td></tr></table> <p>For the given pseudo-code, identify all independent paths using White Box Testing method to determine whether the program is adequately testable.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <p>1. START</p> <p>2. INPUT number</p> <p>3. original ← number</p> <p>4. sum ← 0</p> <p>5. WHILE number &gt; 0 DO</p> <p>6.     digit ← number MOD 10</p> <p>7.     sum ← sum + digit^3</p> <p>8.     number ← number DIV 10</p> | <p>9. END WHILE</p> <p>10. IF sum = original THEN</p> <p>11.     PRINT "Armstrong Number"</p> <p>12. ELSE</p> <p>13.     PRINT "Not an Armstrong Number"</p> <p>13. END IF</p> <p>14. STOP</p> | 10 | 4 | 5 |
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