REG.NO.:

VIT
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING
CONTINUOUS ASSESSMENT TEST - II
WINTER SEMESTER 2024-2025

SLOT: G2 + TG2

Programme Name & Branch	**: B.TECH. CSE**
Course Code and Course Name	**: BCSE301L and Software Engineering**
Faculty Name(s)	**: Sivaprakash S, Anand Bihari, Poornima N, Adrija Bhattacharya, Prabin S M, Jafar Ali Ibrahim S, Deepa.K, Samriddhi Sarkar, Mehfooza, Krishnaraj N, Saurabh Agrawal, Deepika J, Ramesh Babu K, Ushus Elizebeth Zachariah, Baskaran P, Parthiban K, Priya Ponnuswamy P, Shashank Mouli Satapathy, Bhawana Tyagi, Anto S, Yoganand S, Naveenkumar J, Baiju B V**
Class Number(s)	**: VL2024250504791, 2237, 5798, 2290, 4790, 2264, 2235, 2287, 2230, 2260, 2282, 2280, 2306, 2232, 4806, 2240, 2277, 2297, 4789, 2302, 2275, 2304, 2251**
Date of Examination	**: 22-March-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)
- Course Outcomes
- **CO2:** Demonstrate various software project management activities that include planning Estimations, Risk assessment and Configuration Management
- **CO3:** Perform Requirements modelling and apply appropriate design and testing heuristics to produce quality software systems.

Q. No	Question	M	CO	BL
1.	You are leading a team developing an e-learning platform that offers interactive courses, live virtual classes, automated tests, and progress tracking. The platform must support up to 10,000 users at the same time and connect with third-party tools like payment systems, video conferencing, and learning management systems (LMS). The project has a tight deadline, and the client wants high performance, scalability, and security. During planning, your team identified some risks that could affect the project. i. Identify and list five potential risks, their type and likelihood that could arise during the development of the e-learning platform. **(5 Marks)** ii. Create a detailed Risk Information Sheet (RIS) for any one of the identified risks. **(5 Marks)**	10	2	4
2.	You are part of a software development team tasked with designing an air traffic control (ATC) system, a hard real-time system where delays or failures could lead to catastrophic consequences. The system is responsible for monitoring and managing aircraft movements within a designated airspace, ensuring safe distances between planes, guiding them during take-off and landing, and providing real-time alerts to air traffic controllers. Radar systems continuously track the position, altitude, speed, and heading of all aircraft in the airspace and feed this data into the ATC system.. The system processes the radar data and displays it on a graphical interface for air traffic controllers, enabling them to make informed decisions. It also calculates potential collision risks based on	10	3	3

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	predefined safety thresholds, such as minimum separation distances. If a potential collision is detected, the system immediately generates an alert and recommends corrective actions, such as adjusting altitude or heading. Instructions are then communicated to pilots via radio or automated messaging systems. To ensure uninterrupted operation, the system must seamlessly switch to a backup server within milliseconds in the event of hardware or network failure, maintaining the integrity and reliability of the entire operation. i. For this scenario, model the structural blueprint of the system, outlining its key entities and their interconnections using UML approach. **(5 Marks)** ii. Depict the temporal ordering of method calls/messages and object interactions within the system using UML approach. **(5 Marks)**			
3.	Below are six modules interaction given for a Library Management system. Identify the type of coupling in the interaction and types of cohesion that the modules exhibit wherever applicable. Justify the answer. i. When a user logs in, the User Management Module verifies the credentials and checks for any pending fines. It then sends the user's status (active/inactive) and fine details to the Borrowing Module, which decides whether the user can borrow a book. **(2 Marks)** ii. When a user borrows a book, the Borrowing Module directly accesses and updates the book's availability status in the Book Management Module's database tables. **(2 Marks)** iii. When a book is borrowed, the Borrowing Module calls the Notification Module and passes the user's contact details, book title, and return due date as function arguments. The Notification Module then sends an email or SMS. **(2 Marks)** iv. The Report Generation Module retrieves structured data (e.g., JSON responses) from the Borrowing Module, Book Management Module, and User Management Module to generate a report on overdue books and most borrowed books. It does not modify any data, only reads it. **(2 Marks)** v. Inside the Borrowing Module, the following steps occur sequentially when a user borrows a book: **(1 Mark)** a. Validate user eligibility b. Check book availability c. Update borrowing records d. Adjust book availability e. Notify the user vi. The Notification Module checks a user's preferred mode of communication (email/SMS/push notifications). It then selects a function based on this preference using multiple if-else conditions. **(1 Mark)**	10	3	2
4.	a) A Food Delivery System follows the workflow given below: ▪ A customer places an order by selecting items from a menu. ▪ The system verifies the payment and generates an order confirmation. ▪ The order is sent to the restaurant for preparation. ▪ Once prepared, a delivery agent is assigned. ▪ The delivery agent picks up the order and delivers it to the customer. Does this system exhibit transaction flow or transform flow ? Justify your answer by explaining how the control of execution flows through the different processes.	5	3	3

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	b) A payment system is being designed for an e-commerce website. There are two different ways to structure the system - The first method creates a general Payment class, with specific types like Credit_Card, PayPal, and UPI as subclasses. The second method starts with a single Payment_Processor module, which is later divided into separate handlers for each payment method. Which method uses abstraction, and which one uses refinement? Which approach is better for adding new payment methods in the future? Justify your answer.	5		

5.	For the code snippet provided below:
	i. Calculate the cyclomatic complexity (4 Marks)
	ii. Identify all independent paths (2 Marks)
	iii. Write test cases to cover all independent paths (4 Marks)
	
	`#include <stdio.h>`
	`#include <string.h>`
	
	`float calculate_discount(float total_amount, int is_member, char coupon_code[]) {`
	`  if (total_amount <= 0)`
	`  {`
	`  return 0;`
	`  }`
	`  float discount = 0;`
	`  if (is_member)`
	`  {`
	`  discount += total_amount * 0.1;`
	`  }`
	`  if (strcmp(coupon_code, "SAVE20") == 0)`
	`  {`
	`  discount += total_amount * 0.2;`
	`  } else if (strcmp(coupon_code, "SAVE10") == 0)`
	`  {`
	`  discount += total_amount * 0.1;`
	`  }`
	`  float max_discount = total_amount * 0.3;`
	`  if (discount > max_discount)`
	`  {`
	`  discount = max_discount;`
	`  }`
	`  float final_amount = total_amount - discount;`
	`  return final_amount;`
	`}`
		10	3	2

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