

**VIT****Vellore Institute of Technology**
(Deemed to be University under section 3 of UGC Act, 1956)**REG.NO.:**

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING
CONTINUOUS ASSESSMENT TEST – I AK
WINTER SEMESTER 2024-2025

SLOT: G1

Programme Name & Branch : **B.Tech CSE Core and All Specialization**
Programme Name & Branch : **B.Tech CSE Core and All Specialization**
Course Code and Course Name : **BCSE301L – Software Engineering**
Faculty Name(s) : PEREPI RAJARAJESWARI, MADHAN E S, KRISHNARAJ N, BAIJU B V, USHUS ELIZABETH ZACHARIAH, BASKARAN P, SUNILKUMAR G, AKILA VICTOR, ARIVOLI A, SWATHI J.N, PRABIN S, YOGANAND S, DEEPA.K, SAMRIDDHI SARKAR, ADRIJA BHATTACHARYA, BHAWANA TYAGI, ANAND BIHARI, DEEPIKA J, SAURABH AGRAWAL, SIVAPRAKASH S, GOWTHAMI V, PRIYA PONNUSWAMY P
Class Number(s) : VL2024250502303, VL2024250502265, VL2024250502259, VL2024250502249, VL2024250502231, VL2024250502268, VL2024250502276, VL2024250502300, VL2024250502301, VL2024250502292, VL2024250505540, VL2024250502273, VL2024250502233, VL2024250502284, VL2024250502289, VL2024250502242, VL2024250502236, VL2024250502279, VL2024250502281, VL2024250502253, VL2024250502299, VL2024250502305
Date of Examination : **02-02-2025 FN**
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)
 CO1: Apply and assess the principles of various process models for the software development.
 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.	a.) A technology company, Tech Innovators Ltd., plans to develop a cutting-edge, highly customizable Enterprise Resource Planning (ERP) system for small size enterprise. This system will integrate various business functions, such as finance, human resources, supply chain management, and customer relationship management, into a unified platform. The requirements for the application are clearly defined by the customer and duration for project is from 4 to 5 months. Identify the appropriate process model and explain the process in detail. (7 Marks) Mark Split-up : 2 mark for identification of model and 5 mark for the explanation of process Answer : Model: Water Fall model 1. Requirement Analysis • Goal: To gather and document all the requirements for the ERP system. • Activities:	10	CO1	BL-3



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	○ Conduct meetings with stakeholders to understand their needs. ○ Create detailed requirement specifications for various business functions, such as finance, human resources, supply chain management, and customer relationship management. • Outcome: A comprehensive requirement specification document that outlines all the features and functions needed. 2. System Design • Goal: To design the system architecture based on the documented requirements. • Activities: ○ Develop system and software architecture. ○ Create detailed design documents, including data flow diagrams, system architecture diagrams, and database schemas. • Outcome: Design documents that provide a blueprint for the implementation phase. 3. Implementation • Goal: To develop the actual ERP system by coding. • Activities: ○ Translate design documents into source code. ○ Develop each module corresponding to different business functions (finance, HR, supply chain, CRM) in a step-by-step manner. • Outcome: Source code for the ERP system modules. 4. Integration and Testing • Goal: To ensure all system components work together and function as intended. • Activities: ○ Integrate different modules developed during the implementation phase. ○ Perform system testing, including unit tests, integration tests, and system tests to validate the functionality of the ERP system. • Outcome: A fully tested and integrated ERP system that meets the specified requirements. 5. Deployment • Goal: To deploy the system in the production environment. • Activities: ○ Install the ERP system at the customer site. ○ Configure and set up the system for operational use. ○ Train end-users on how to effectively use the ERP system.			
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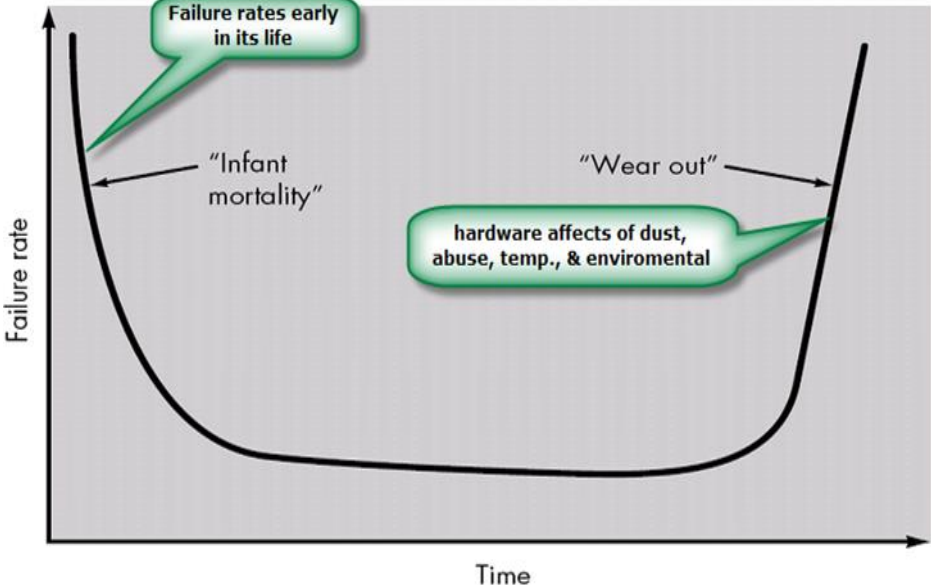
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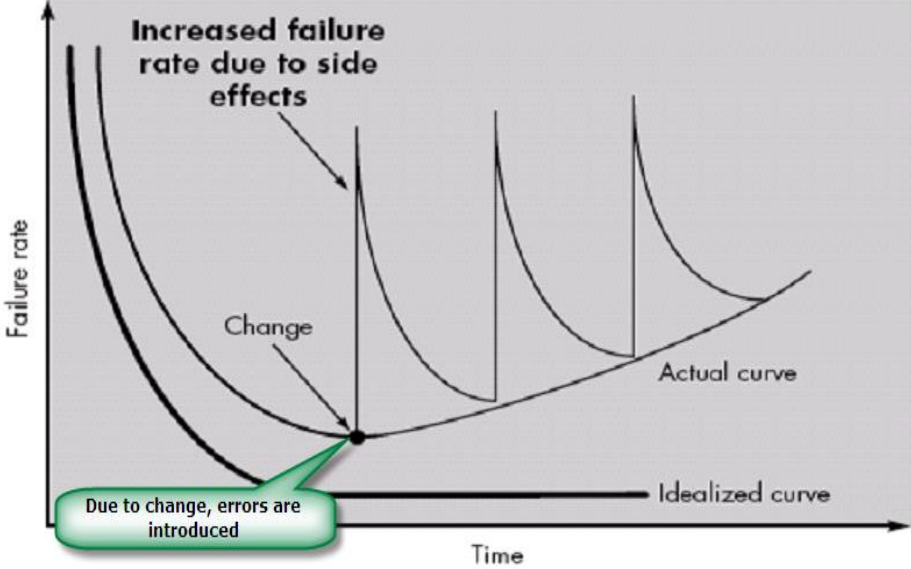
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	• Outcome: The ERP system is operational and in use by the small-sized enterprises. 6. Maintenance • Goal: To provide ongoing support and updates for the ERP system. • Activities: ○ Fix any issues or bugs that arise during the operational phase. ○ Implement enhancements or updates based on user feedback. b.) Compare the failure curves for hardware, civil, electrical, and software projects. Highlight their unique characteristics and typical failure rates over their lifecycle stages. Discuss the factors influencing failures and mitigation strategies for each project type. (3 Marks) Mark Split up :1.5 mark for hardware curve and 1.5 mark for software Curve and justifications  The graph plots Failure rate on the y-axis against Time on the x-axis. The curve starts at a high failure rate, drops sharply to a low, stable rate, and then rises again. A green callout bubble points to the initial steep decline, stating 'Failure rates early in its life'. Another green callout bubble points to the final steep rise, stating 'hardware affects of dust, abuse, temp., & enviromental'. The initial steep decline is labeled 'Infant mortality' and the final steep rise is labeled 'Wear out'.			
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2.	a.) Imagine you are part of a software development team tasked with creating a new e-commerce platform for a client. The project is complex, involving multiple features such as user authentication, product catalog management, shopping cart functionality, payment processing, and customer reviews. The client has a broad vision but is unsure about specific requirements and expects changes as the project progresses and they want to have worked model from beginning of the development. Which model is suitable to solve this problem and explain model with scenario. (7 Mark) Mark Split Up : Identification of Model 2 marks and explanation 5 Marks For this scenario, the Agile Model is a suitable process model. Agile is designed to handle changing requirements and involves continuous iterations, allowing for a working model to be available early in the development process. Here's how the Agile Model can be applied to your e-commerce platform project: Agile Model 1. Project Initiation • Goal: To kick off the project with a broad understanding of the vision. • Activities: ○ Conduct initial meetings with the client to gather high-level requirements. ○ Establish a product backlog with features such as user authentication, product catalog management, shopping cart functionality, payment processing, and customer reviews.	10	CO1	BL-3



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	○ Form an Agile team with defined roles (e.g., product owner, scrum master, development team). • Outcome: A prioritized product backlog and a clear project vision. 2. Sprint Planning • Goal: To plan the work for the upcoming sprint (usually 2-4 weeks). • Activities: ○ Select user stories from the product backlog to be completed in the sprint. ○ Break down user stories into tasks. ○ Estimate the effort required for each task. • Outcome: A sprint backlog with a detailed plan for the sprint. 3. Sprint Execution • Goal: To develop and deliver a working increment of the e-commerce platform. • Activities: ○ Design, code, and test features iteratively within the sprint. ○ Conduct daily stand-up meetings to track progress and address issues. ○ Collaborate closely with the client to refine requirements and gather feedback. • Outcome: A working increment of the e-commerce platform, including key features like user authentication and product catalog management. 4. Sprint Review • Goal: To demonstrate the completed work to the client and gather feedback. • Activities: ○ Conduct a sprint review meeting with the client. ○ Demonstrate the functionality developed during the sprint. ○ Collect feedback and update the product backlog accordingly. • Outcome: Client feedback and potentially new or refined requirements. 5. Sprint Retrospective • Goal: To reflect on the sprint and identify areas for improvement. • Activities: ○ Conduct a retrospective meeting with the Agile team. ○ Discuss what went well, what didn't, and how to improve.			
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	● Outcome: Actionable insights for continuous improvement in future sprints. b.) Explain the Umbrella Activities that are carried out in the development of software project (3 Marks) Marks : 1 Marks for activities & 2 Marks explanation Answer : ● Software project management ● Formal technical reviews ● Software quality assurance ● Software configuration management ● Work product preparation and production ● Reusability management ● Measurement ● Risk management																																																																																											
3.	a) You have a project with the following activities and their respective optimistic (O), most likely (M), and pessimistic (P) time estimates <table><tr><th>Activity</th><th>Predecessor Activity</th><th>Optimistic (O)</th><th>Most likely(M)</th><th>Pessimistic</th></tr><tr><td>A</td><td>-</td><td>2</td><td>3</td><td>5</td></tr><tr><td>B</td><td>A</td><td>4</td><td>5</td><td>8</td></tr><tr><td>C</td><td>A</td><td>3</td><td>4</td><td>6</td></tr><tr><td>D</td><td>B</td><td>5</td><td>7</td><td>10</td></tr><tr><td>E</td><td>C</td><td>6</td><td>8</td><td>12</td></tr><tr><td>F</td><td>D,E</td><td>3</td><td>4</td><td>6</td></tr><tr><td>G</td><td>F</td><td>4</td><td>5</td><td>7</td></tr></table> Calculate the following: i. Expected time (TE) for each activity using PERT. (3 Marks) ii. Create a network diagram for the project and find the total duration of the project. (3 Marks) Answer : <table><tr><th>Activity</th><th>Predecessor Activity</th><th>Optimistic (O)</th><th>Most Likely (M)</th><th>Pessimistic</th><th>Expected time (TE)</th></tr><tr><td>A</td><td>-</td><td>2</td><td>3</td><td>5</td><td>3.17</td></tr><tr><td>B</td><td>A</td><td>4</td><td>5</td><td>8</td><td>5.33</td></tr><tr><td>C</td><td>A</td><td>3</td><td>4</td><td>6</td><td>4.17</td></tr><tr><td>D</td><td>B</td><td>5</td><td>7</td><td>10</td><td>7.17</td></tr><tr><td>E</td><td>C</td><td>6</td><td>8</td><td>12</td><td>8.33</td></tr><tr><td>F</td><td>D, E</td><td>3</td><td>4</td><td>6</td><td>4.17</td></tr><tr><td>G</td><td>F</td><td>4</td><td>5</td><td>7</td><td>5.17</td></tr></table> ii)	Activity	Predecessor Activity	Optimistic (O)	Most likely(M)	Pessimistic	A	-	2	3	5	B	A	4	5	8	C	A	3	4	6	D	B	5	7	10	E	C	6	8	12	F	D,E	3	4	6	G	F	4	5	7	Activity	Predecessor Activity	Optimistic (O)	Most Likely (M)	Pessimistic	Expected time (TE)	A	-	2	3	5	3.17	B	A	4	5	8	5.33	C	A	3	4	6	4.17	D	B	5	7	10	7.17	E	C	6	8	12	8.33	F	D, E	3	4	6	4.17	G	F	4	5	7	5.17	10	CO2	BL-3
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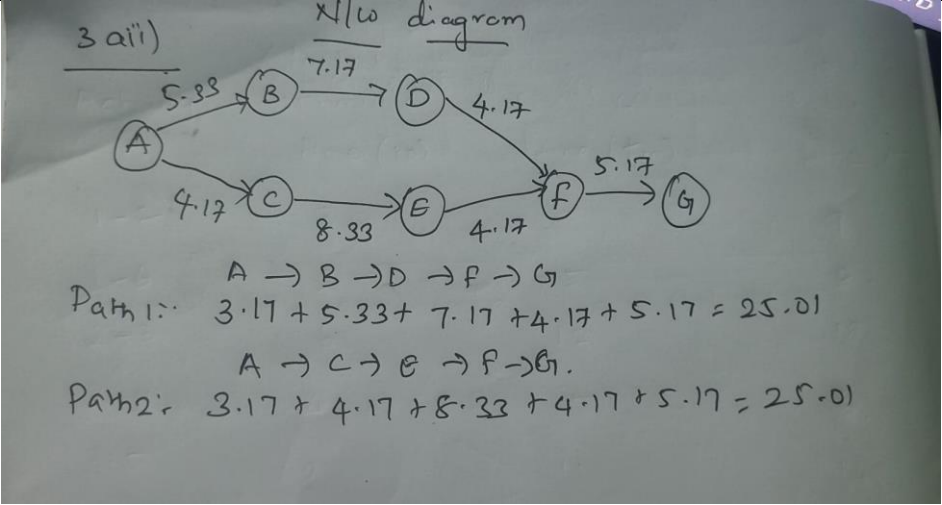
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	 b.) Draw the work breakdown structure for the online food delivery app by using process based with three levels (4 marks) Mark Split up : 4 Mark for the work break down structure for the project (1 Mark is for level1 and 2 mark is for level 1.1 and subsections and 1 mark for Level 1.1.1 and sub sections			
4.	a.) A software development project involves creating a complex application that is estimated to have around 150,000 delivered source instructions (DSI). Using the Basic COCOMO model, estimate the effort (in person-months) and development time (in months) required for the project. The project is categorized as an embedded project. (for embedded projects A= 3.6, B= 1.20, C= 2.5,D=0.32). Mark Split up : 1 Mark for the conversion of the source instruction to KLOC 1 mark for the formula 3 mark for the calculation Answer: Effort = 1470.99 Person = 25.71 b.) Compare the different types of projects: organic, semi-detached, and embedded. Discuss their unique properties and characteristics. Provide an example scenario for each type. Highlight key differences and similarities among these project types. (5 Marks) Mark Split up: 3 mark for the unique properties and characteristics and key differences and similarities among these project types. 2 mark for the example for the projects Answer : 1.Organic Projects: Organic projects are small in size, simple in structure, and involve teams with good communication and familiarity. They usually have well-understood requirements and a flexible approach to development.	10	CO2	BL-3



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	Unique Properties: • Small, cohesive teams. • Simple and straightforward project requirements. • High level of team familiarity and good communication. • Low complexity and fewer risks. Example Scenario: Developing a basic website for a small local business, where the requirements are clear, the development team is small, and the project duration is short. 2. Semi-Detached Projects: Semi-detached projects are of medium size and complexity. They involve a mix of experienced and less experienced team members and may have moderately complex requirements and deliverables. Unique Properties: • Medium-sized teams with a mix of expertise. • Moderately complex requirements. • Balanced approach to flexibility and structure. • Moderate risks and challenges. Example Scenario: Developing a mobile app for a mid-sized company that includes features like user authentication, push notifications, and data synchronization. 3. Embedded Projects: Embedded projects are large, complex, and involve stringent requirements, often with real-time processing or critical safety concerns. These projects usually have large teams with varied expertise and require rigorous management and coordination. Unique Properties: • Large, multi-disciplinary teams. • High complexity and stringent requirements. • Critical safety or real-time processing needs. • High risks and significant challenges. Example Scenario: Developing software for an autonomous vehicle, where the system must process real-time sensor data, ensure passenger safety, and adhere to strict regulatory standards.			
5.	The university aims to develop an ERP (Enterprise Resource Planning) system to streamline their entire operational process. They plan to assign this project to XY Software Development Organization. As the project manager, explain and identify the following: (5 X 2 marks) User Requirements System Requirements Stakeholders (Direct, Indirect) Functional Requirements (2 No's) Non-functional Requirements (2 No's) Mark Split up : 5* 2 mark for Each Requirements Answer: i. User Requirements User requirements refer to what the end-users need from the ERP system. These include:	10	CO3	BL-2



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• Ease of Use: The system should be user-friendly and intuitive, requiring minimal training for staff and students. • Accessibility: Users should be able to access the system anytime, anywhere, using different devices like PCs, tablets, and smartphones. ii. System Requirements System requirements encompass the technical needs and specifications for the ERP system. These include: • Scalability: The system should handle the current user load and be scalable to accommodate future growth. • Data Security: The system must ensure data protection through encryption, secure access controls, and regular security updates. iii. Stakeholders (Direct, Indirect) Stakeholders are individuals or groups with an interest in the project. They can be divided into direct and indirect stakeholders. • Direct Stakeholders: ○ University Staff: Administrators, faculty, and IT personnel who will use and manage the system. ○ Students: Primary users who will interact with the system for course registration, grades, etc. • Indirect Stakeholders: ○ Parents: Interested in accessing students' academic progress. ○ External Auditors: Individuals who need to access the system for auditing purposes. iv. Functional Requirements (2 Examples) Functional requirements describe specific behaviors or functions of the system. Examples include: • Student Information Management: The system should manage student records, including personal details, enrollment status, and academic history. • Course Registration: The system should allow students to register for courses, view available classes, and manage their schedules. v. Non-functional Requirements (2 Examples) Non-functional requirements refer to the system's performance and usability characteristics. Examples include: • Performance: The system should respond to user inputs within 3 seconds under typical load conditions. • Reliability: The system should have an uptime of 99.9%, ensuring it is almost always available to users.			
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