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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

June 2025 Semester End Main Examinations

Programme: B.E. **Semester: V**
Branch: Artificial Intelligence and Machine Learning **Duration: 3 hrs.**
Course Code: 23AM5PCSED **Max Marks: 100**
Course: Software Engineering and Design Patterns

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

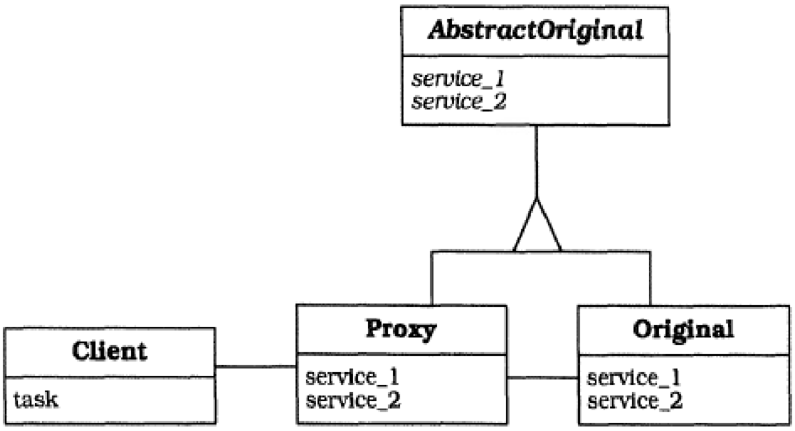
Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	***CO***	***PO***	**Marks**
1	a)	Elucidate the definition of software as per the IEEE Standard, subsequently analyse the following ensuing statements. i. Software is subject to development or engineering procedures, it does not undergo manufacturing in the traditional sense. ii. Software doesn't wear out.	*CO 1*	*PO 1*	**10**
	b)	How do the seven Principles of Software engineering practice collectively contribute in development of a structured software development projects?	*CO 1*	*PO 2*	**10**
		OR			
2	a)	Suggest strategic implementation of Verification and Validation model to ensure the highest level of software quality.	*CO 1*	*PO 1*	**10**
	b)	Compare V-Model and Waterfall model in detail.	*CO 1*	*PO 2*	**10**
		UNIT – II			
3	a)	Imagine Alice is a project manager tasked with ensuring high-quality software development. Illustrate how would he adopt and adhere to software quality guidelines in the project?	*CO 1*	*PO 1*	**4**
	b)	Compare Halsted metrics with Cyclomatic Complexity. Analyze the following code and calculate the cyclomatic complexity using all the three methods. 1. begin int x, y, power; 2. float z; 3. input(x, y); 4. if(y<0) 5. power = -y; 6. else power = y; 7. z=1; 8. while(power!=0) 9. { z=z*x; 10. power=power-1; 11. } if(y<0) 12. z=1/z; 13. output(z); 14. end	*CO 1*	*PO 2*	**8**

		c)	Design an activity diagram for withdrawing the amount from ATM machine scenario.	*CO 1*	*PO 3*	**8**
			OR			
	4	a)	Design a class diagram for a library management system. Identify the classes, relationships, methods, attributes and connect the classes accordingly.	*CO 1*	*PO 2*	**10**
		b)	Describe a scenario to balance the trade-off between high coupling and high cohesion. Justify whether it is more appropriate for the project to prioritize high coupling, high cohesion, or find an optimal balance between the two.	*CO 1*	*PO 2*	**10**
			UNIT - III			
	5	a)	Compare and contrast between black box testing and white box testing with any one testing strategy each.	*CO 2*	*PO 1*	**10**

		b)	Design a control flow graph for the source code provided below. Identify the number of independent paths and cyclomatic complexity for the same.
			Int main()
			{
			6 int n, index;
			2 cout << "Enter a number: " <> n;
			3 index = 2;
			4 while (index <= n – 1)
			5 {
			6 if (n % index == 0)
			7 {
			8 cout << "It is not a prime number" << endl;
			9 break;
			10 }
			11 index++;
			12 }
			13 if (index == n)
			14 cout << "It is a prime number" << endl;
			15 } // end main
				CO 2	*PO 2*	**10**

			OR			
	6	a)	Elaborate on white box testing, alpha and beta testing strategies with examples.	*CO 2*	*PO 1*	**10**
		b)	Define the following terms: i. Predicate use ii. Computational use II) Identify different strategies for loop testing.	*CO 2*	*PO 2*	**10**
			UNIT – IV			
	7	a)	Despite the widespread adoption of conventional process models in software engineering, justify the importance of patterns in development stages.	*CO 2*	*PO 1*	**5**

		b)	Analyze the following class diagram and transform the same to Class Responsibility Collaboration (CRC) representation.  AbstractOriginal service_1 service_2 Client task Proxy service_1 service_2 Original service_1 service_2	*CO 2*	*PO 2*	**6**
		c)	Develop a sequence diagram to depict an MVC (Model-View-Controller) scenario where the code for the model is situated external to the model, view, and controllers.	*CO 2*	*PO 1*	**9**
			OR			
	8	a)	Create a sequence diagram to depict a Pipe and Filter pattern, where there are passive components representing the source and sink, and multiple active filters in between.	*CO 3*	*PO 2*	**9**
		b)	Provide the implementation steps for a Layered Pattern.	*CO 3*	*PO 1*	**6**
		c)	Demonstrate working of broker pattern in terms of its CRC cards.	*CO 3*	*PO 1*	**5**
			UNIT – V			
	9	a)	Provide an illustration of the proxy pattern and discuss the various types of proxy patterns.	*CO 3*	*PO 2*	**10**
		b)	Exemplify scenarios where the Façade design pattern can be effectively employed to streamline interactions among its various subsystems, simplifying the overall system design and maintenance.	*CO 3*	*PO 1*	**10**
			OR			
	10	a)	Describe the procedure to be followed in constructing Decorator design pattern and provide CRC for the same	*CO 3*	*PO 2*	**10**
		b)	Illustrate master-slave design pattern with CRC representation	*CO 3*	*PO 1*	**10**

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