MAULANA AZAD NATIONAL INSTITUTE OF TECHNOLOGY BHOPAL
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
EXAMINATION: END SEMESTER   MONTH and YEAR: MAY 2025

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Course: B. Tech Semester: IV Branch: Computer Science & Engineering	Subject Code: CSE 225
	Maximum Marks: 50
Subject Name: Software Engineering Date: 16/05/2025	Time: 8 AM to 11 AM
Duration: 3 hours	

Note: *All questions are compulsory. The solution to each subpart of a question should be written in the same place.*

	Questions	Marks	COs
Q. No.			

1. (a) Identify any inconsistencies, anomalies, and incompleteness that are present in the following requirements that were gathered by interviewing the clerks of the CSE department for developing an academic automation software (AAS): "The CGPA of each student is computed as the average performance for the semester. The parents of all students having poor performance are mailed a letter informing about the poor performance of their ward and with a request to convey a warning to the student that the poor performance should not be repeated."   **5   CO1**

(b) Through a simple plot explains how the reliability of a software product changes over its lifetime. Draw the reliability change for a hardware product over its lifetime and explain why the two plots look so different.   **5**

2. (a) Suppose you are the project manager of a large software development project, point out the main steps you would follow to manage various risks in your software project. List three common types of risks that a typical software project might suffer from. Explain how you can identify the risks that your project is susceptible to.   **5   CO1**

(b) You are the IT manager at a mid-sized logistics company looking to implement a custom inventory management software system. To ensure smooth adoption and long-term usability, you set the following preconditions for the software purchase: **5**

- The vendor must install and configure the software.
- Your staff must be trained to use it effectively.
- The vendor must provide maintenance and support for at least one year.
- Full payment will only be released after the software is installed, staff are trained, and the system runs satisfactorily.

You receive proposals from three vendors:

- **Vendor A** quotes ₹3 lakhs.
- **Vendor B** quotes ₹4 lakhs.
- **Vendor C** quotes ₹10 lakhs, justifying the higher cost by stating they follow a rigorous development methodology and are certified at **SEI CMM Level 5**, ensuring high-quality processes and minimal post-deployment issues.

You also believe that after successful installation and training, **very little maintenance will be needed**.

Given the scenario, how would you evaluate these bids? What factors should influence your final decision beyond just price, and how much weight should be given to the vendor's process maturity (e.g., SEI CMM Level 5) when you anticipate low maintenance needs?

3. (a) Using Halstead's software metrics, calculate the estimated length and volume of the following C program. Which are the unique operators and operands will you take for this C program? Compare Halstead's length and volume measures of size with the LOC measure?   **5   CO2**

```c
main()
{
    int a, b, c, avg;
    scanf("%d %d %d", &a, &b, &c);
    avg = (a + b + c) / 3;
    printf("avg= %d", avg);
}
```

(b) Consider two alternate design solutions to a problem that are represented in given figure 1. Identify which design exhibits better cohesion and coupling combination. Justify your answer based on the control flow and module interactions. Further, show how cohesiveness increases through different classes of cohesion that modules can possess? Also show different types of coupling in increasing order of their severities.   5
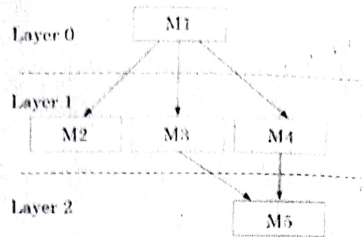
(a) Layered design with good control abstraction
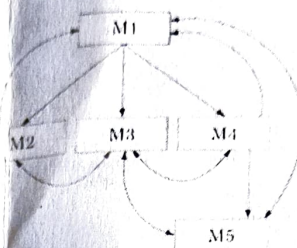
(b) Layered design showing poor control abstraction

4. (a) Suppose a project size is estimated to be 400 KLOC. Calculate the effort and time for each of the three modes of development (Organic, Semi-Detached, Embedded) using the Basic COCOMO model. (All the constant values will be standard). How does the effort calculation in the Intermediate COCOMO model differ from the Basic COCOMO model? Explain the role of the Effort Adjustment Factor (EAF) in the Intermediate COCOMO model and its importance in the effort calculation.   5   CO3

(b) A project consists of the following activities: 5
   - Draw the network diagram.
   - Identify all possible paths and calculate the duration.
   - Find the critical path and the total project duration.

Activity	Predecessor(s)	Duration (days)
A	-	4
B	A	3
C	A	2
D	B, C	5
E	C	4
F	D, E	6

5. (a) Design test cases using Boundary Value Analysis (BVA) for a login system that allows password lengths between 6 and 12 characters.   4   CO3

(b) Find the Cyclometric Complexity of given program.   4
```
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
```

(c) What is Mutation Testing? Give a practical example.   2

*********END*********

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