



AUTUMN END SEMESTER EXAMINATION-2024

5th Semester B.Tech

SOFTWARE ENGINEERING

CS31001 / IT-3003 / IT 3003

(For 2023 (L.E), 2022 & Previous Admitted Batches)

Time: 2 Hours 30 Minutes

Full Marks: 50

Answer any FIVE questions.

Question paper consists of two SECTIONS i.e. A and B.

Section A is compulsory.

Attempt any Four question from Sections B.

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable and all parts of a question should be answered at one place only.

SECTION-A

1. Answer the following questions. [1 × 10]
 - (a) What is the primary goal of software engineering?
 - (b) What is pair programming? What are its advantages over traditional programming?
 - (c) What is SCRUM? List the SCRUM artifacts.
 - (d) List different requirement gathering techniques used in software engineering.
 - (e) List at least four major responsibilities of a software project manager.
 - (f) With suitable example (diagram), explain the concept of fan-in and fan-out. Is high fan-in and low fan-out a good design (Yes/No)?
 - (g) What do you understand by positive and negative test cases? Give an example.

- (h) What is the role of stub and driver in unit testing? Support your answer through a diagram (example) depicting stub and driver.
- (i) With schematic diagram, mention the steps carried out in a reverse engineering process of a legacy software product.
- (j) Which ISO quality assurance standard applies to
- 1) Software development organization?
 - 2) Steel manufacturing company?

SECTION-B

2. (a) Which life cycle model encourages product functionality development incrementally through heavy code and design reuse? Explain the different phases of this life cycle model with schematic diagram. [5]
- (b) Discuss the importance of the testing phase in the SDLC. How does it contribute to the overall success of software development, and what are the key types of testing involved? [5]
3. (a) Draw a Use Case of the given problem description: [5]
- Consider a lending book system of a university library. A library user (student or faculty) can borrow a book if he or she does not have any outstanding fines or overdue books. A book may be borrowed for up to 15 days at a time. A book loan may be renewed if the book is returned before the loan's due date and if no other library member has expressed an interest in borrowing the book. If a book is returned after the loan's due date, the borrower will be charged a fine of ₹10/- for each late day. Fines are paid to the library staff at the book lending desk, where books are returned. The heavily-used books may be put on reserve, meaning that members can issue for reading in the library but cannot borrow them.

- (b) Describe Cohesion and Coupling in the context of software design. Why is it important to have high cohesion and low coupling in a software system? Provide examples to support your explanation. [5]
4. Consider the following problem description of a Judiciary Information System (JIS): [4+4+2]

The Judiciary Information System (JIS) is designed to help handle court cases and also to make the past court cases easily accessible to the lawyers and judges. For each court case, the name of the defendant, defendant's address, the crime type (e.g., theft, arson, etc.), when committed (date), where committed (location), name of the arresting officer, and the date of the arrest are entered by the court registrar. Each court case is identified by a unique *case identification number* (CIN) which is generated by the computer. The registrar assigns a date of hearing for each case. For this the registrar expects the computer to display the vacant slots on any working day during which the case can be scheduled. Each time a case is adjourned, the reason for adjournment is entered by the registrar and he assigns a new hearing date. If hearing takes place on any day for a case, the registrar enters the summary of the court proceedings and assigns a new hearing date. Also, on completion of a court case, the summary of the judgment is recorded and the case is closed but the detail of the case is maintained for future reference. Other data maintained about a case include the name of the presiding judge, the public prosecutor, the starting date, and the expected completion date of a trial. The judges should be able to browse through the old cases for guidance on their judgment. The lawyers should also be permitted to browse old cases, but should be charged for each old

case they browse. Using the JIS software, the Registrar of the court should be able to query the following:

- i) The currently pending court cases. In response to this query, the computer should print out the pending cases sorted by CIN. For each pending case, the following data should be listed—the date in which the case started, the defendant's name, address, crime details, the lawyer's name, the public prosecutor's name, and the attending judge's name.
- ii) The cases that have been resolved over any given period. The output in this case should chronologically list the starting date of the case, the CIN, the date on which the judgment was delivered, the name of the attending judge, and the judgment summary.

Answer the following:

- a) Write SRS document (Only given functional requirement along their inputs and outputs).
 - b) Draw the DFD (context and higher level DFD) diagram.
 - c) Draw the structure chart from 1-level DFD.
5. (a) Calculate the effort (person-months), development time (months), and cost for a software project with an estimated size of 50,000 lines of code (KLOC = 50). Assume it is a semi-detached project and the average salary per month of software engineer is ₹40,000/-.
- (b) A software development team is tasked with developing a customer management system. The project involves the following components:

- 5 External Inputs (EI) with average complexity: Adding and updating customer information.
- 3 External Outputs (EO) with low complexity: Generating reports for customer details and transactions.
- 2 External Inquiries (EQ) with average complexity: Searching for customer information.
- 4 Internal Logical Files (ILF) with average complexity: Databases that store customer, transaction, and product information.
- 2 External Interface Files (EIF) with high complexity: Interfaces with external systems for payment processing.

Assume that the DI (degree of influence) is 20.

Calculate the UFP, TCF and FP for this project.

6. (a) Suppose an organization mention in its job advertisement that it has been assessed at level-3 of SEI CMM, what can you infer about the current quality practices at the organization? What does this organization have to do to reach SEI CMM level-4? Write the key process area of CMM Level-3 and Level-4. [5]
- (b) “Over the years, the quality paradigm has shifted from product assurance to process assurance” - Explain in detail this by mentioning the evolution of quality system. [5]
7. (a) What is Code Review? Why is it important in Software Development? Explain in detail, different types of code review techniques. [5]

- (b) What is Coverage Based Testing? What are different types? [5]

Draw the Control Flow Graph and calculate the cyclomatic complexity of the following program:

```
1. void SelectionSort(int array1[]) {  
2.     int size = array1.length;  
3.     for (int i = 0; i < size-1; i++) {  
4.         int minIndex = i;  
5.         for (int j = i+1; j < size; j++)  
6.             if (array1[j] < array1[minIndex])  
7.                 minIndex = j;  
8.         int temp = array1[minIndex];  
9.         array1[minIndex] = array1[i];  
10.        array1[i] = temp;  
11.    }  
12. }
```
