B3.3-R4: SOFTWARE ENGINEERING & CASE TOOLS

NOTE:

1. **Answer question 1 and any FOUR from questions 2 to 7.**
2. **Parts of the same question should be answered together and in the same sequence.**

Time: 3 Hours **Total Marks: 100**

1.

a) Suppose a C program consists of 240 sequence type of statements, 50 selections type of statements and 40 iteration type of statements; determine the minimum number of test cases required for path testing.

b) Briefly explain the difference between object-oriented analysis (OOA) and object-oriented design (OOD).

c) Code review technique is considered to be more efficient technique for bug removal than testing? Justify briefly. When in a software life cycle is code review performed?

d) What do you understand by formal requirements specification? What are its advantages over informal specifications?

e) What is the difference between functional and non-functional requirements? Give one example of each type of requirement for word processing software.

f) What is a baseline in the context of software configuration management? After a revision of any configuration items, explain how a baseline can be updated to form a new baseline?

g) Suppose an organization mentions 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 that organization?

(7x4)

2.

a) Draw a class diagram using the UML syntax to represent the following aspects concerning a library. An issuable can either be a book or a CD. Books can be either reference books or text books. The details of various issuable are maintained in a register called the issuable register. The library has many members whose details are maintained in a member register. A member can issue upto 10 issuable.

b) What do you understand by inconsistencies, anomalies, and incompleteness in an SRS document? Identify the inconsistencies, anomalies, and incompleteness in the following requirements of academic activity automation software of an educational institute:

"The semester performance of each student is computed as the average academic performance for the semester. The guardians of all students having poor performance in the semester are mailed letters informing about the poor performance of the ward and intimating that repetition of poor performance in the subsequent semester can lead to expulsion. The extracurricular activities of students are also graded and taken into consideration for determination of the semester performance”

c) What do you understand by Key Process Area (KPA) in the context of SEI CMM? Would an organization encounter any problems, if it tries to implement higher level SEI CMM KPAs before achieving the lower level KPAs? Justify your answer using suitable examples.

(6+6+6)

3.

a) What do you understand by requirements validation? How can requirements be validated?

b) Why is reuse much more difficult in software development as compared to hardware development? Explain at least three techniques to enhance software reuse.

c) What do you understand by the principles of abstraction and decomposition? Give at least one example of each of these principles in software engineering?

(6+6+6)

4.

a) Distinguish between black-box and white-box testing. Design the black-box test suite for a function named quadratic-solver. Quadratic-solver accepts three floating point numbers (a,b,c) representing a quadratic equation of the form ax2 + bx + c = 0. It computes and displays the solution.

b) What do you understand by software configuration management? What are the main activities through which it is carried out? What problems would you face if you are developing several versions of the same product according to a client's request, and you are not using any configuration management tools?

c) What do you understand by "build-and-fix" style of software development? Draw a schematic diagram to depict the typical activities that are undertaken in this style of development and the ordering of these activities. Identify at least four major problems that would arise, if a large professional software development project is undertaken using a "build-and-fix" style of software development.

(6+6+6)

5.

a) Suppose the customer feedback for a software product that you have developed is "too difficult to learn". Explain how the speed of learning of the user interface of the product can be increased.

b) Bring out the significance of programming language coding standards. How do they help in improving quality of a computer program?

c) What do you mean by the terms Software Reverse Engineering and Software Reengineering? Why are these required? For a legacy software, based on which factors can a decision be made as to whether reverse engineering or reengineering is appropriate?

(6+6+6)

6.

a) What do you understand by performance testing? What are the different types of performance testing that are performed?

b) What is a real-time system? Why can't traditional design techniques be satisfactorily used for designing real-time systems? Explain the extensions to the traditional design technique necessary for designing real-time systems.

c) What do you understand by the terms integrated CASE environment and CASE workbenches? Draw an architectural diagram of an integrated CASE environment and explain the role of a data dictionary in this environment.

(6+6+6)

7.

a) Why is it important to properly document a software product? List the different ways of documenting a software product and identify the life cycle phase at which these documents are prepared?

b) Develop the context level DFD (level 0) and the level 1 DFD models of an academic grading software having the following features. In this software, teachers first choose the courses they wish to teach. The students can register for specific courses. The teacher would assign grades to the students in his course. Based on the grades obtained in different courses, the grade point average (GPA) of a student would be computed and displayed to the student. You can make suitable assumptions about any other details of this software, but please write down your assumptions.

c) What do you mean by modular design? What are the advantages does a modular design offer?

(6+10+2)