

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) Why does the effort and time required to develop a program using the build and fix model increases exponentially with the size of the program? How do software engineering principles help tackle this rapid rise in development time and cost?
- b) What is the difference between functional and non-functional requirements? Give one example of each type of requirement for a library automation software.
- c) Suggest the life cycle model that would be suitable for developing a large object-oriented development effort. Briefly explain why you consider your suggested life cycle model is likely to be the best choice.
- d) What is the difference between functional testing and structural testing? Is it recommendable to skip functional testing of a program unit, if thorough structural testing has been carried out? Justify your answer.
- e) 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?
- f) What do you understand by an executable specification language? How is it different from a traditional procedural programming language?
- g) Identify two important problems that you would face if you are developing a large software product and you are not using any configuration management tools.

(7x4)

2.

- a) What is the difference between a data flow model and a control flow model of a program? Construct the data flow model of the following program.

```
main(){                                | f(int a,int b){                       | f1(){                                | f2(){                                |
    int a[100,b[100];                  |     if (a>b) f1();                   |     return;                          |     return;                          |
    for(i=0; i<100;i++) f(a[i],b[i]); |     else f2();                       | }                                     | }                                     |
    }                                  | }                                     | }                                     | }                                     |
```

- b) Identify the CASE support that can be availed of during maintenance of large legacy software.
- c) What do you understand by test coverage analysis? Why is it necessary to perform test coverage analysis? Define at least two test coverage metrics.

(6+6+6)

3.

- a) Identify the criteria that you would use to decide which one of the two otherwise correct alternate function-oriented design solutions to a problem is superior.
- b) When during the development process is the compliance with coding standards checked? List two coding standards each for enhancing (i) code maintainability, (ii) code reusability.
- c) What do you mean by the terms software *reengineering* and *reverse engineering*? How is reengineering different from reverse engineering? Discuss a process model for reengineering.

(6+6+6)

4.

- a) What do you understand by inconsistencies, anomalies, and incompletenesses in an SRS document? Identify the inconsistencies, anomalies, and incompletenesses 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 a letter 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 are also graded and taken into consideration for determination of the semester performance".

- b) Draw a class diagram using the UML syntax to represent the fact that an order Register consists of many orders. Each order consists of up to ten order items. Each order item contains the name of the item, its quantity and the date by which it is required. Each order item is described by an item order specification object having details such as its vendor addresses, its unit price, and manufacturer.

(10+8)

5.

- a) What criteria would you use to distinguish a good object-oriented software design from a bad design? Discuss some metrics that can be used to judge the goodness of an object-oriented software design.

- b) 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.

- c) What is the difference between a command language, menu-based, and a direct manipulation interfaces. Compare the relative advantages. Which one (or a mixture of these) would you recommend for developing text editor software.

(6+6+6)

6.

- a) What do you understand by the term phase containment of errors? Why phase containment of errors is important? How can phase containment of errors be achieved?

- b) Explain the cleanroom approach to software development. What are its advantages over conventional testing?

- c) What is the difference between a property-oriented and a model-oriented formal specification method? What are their relative advantages?

(6+6+6)

7.

- a) What is the difference between code inspection and code walkthrough? Give an example of the types of errors detected during code inspection and code walkthrough?

- b) In a software development organization whose responsibility is it to ensure that the products are of high quality? Explain the principal tasks they perform to meet this responsibility.

- c) Why is it important to properly document a software product? What are the different types of documents that need to be developed?

(6+6+6)