

## C8-R3: ADVANCED SOFTWARE ENGINEERING

### NOTE:

1. Answer question 1 and any FOUR questions from 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) Distinguish between an agent and an object.
- b) What is the difference between a state diagram and an activity diagram?
- c) What is regression testing? Why is it necessary to do regression testing?
- d) Compare the key characteristics of the ISO 9000 certification with those of the SEI CMM model for quality appraisal.
- e) Distinguish between software validation and software verification.
- f) What is a prototype? Why do you think building prototype is popular with clients/users?
- g) Discuss the major advantages of the object-oriented design (OOD) methodologies over the data flow-oriented design methodologies.

(7x4)

2.

- a) Draw a structure chart for the following problem explaining the different symbols that are used to draw it.

Ramesh is a young man looking for his first job. He starts with the preliminaries. This consists of writing his CV and submitting it to the placement office, rewriting it until it is acceptable to them. He needs to have his job in his local place, so also produces a letter stating the reasons. Now he is ready to make applications. He regularly checks the industrial placement notice board, different newspaper advertisements and whenever finds a suitable placement he submits an application and wait patiently for an interview. Ramesh arrives at interviews with polished shoes, good dress. He makes his way there and tries to convince them that he is the best person for the job.

- b) Explain what is meant by Bottom Up testing. Your answer should include a description of a test driver.

(10+8)

3. The following C++ function accepts three values as three sides of a triangle. The function returns an enumerated value that states whether the data correspond to No-Triangle (NT), Equilateral (EQ), Isosceles (IS) or Scalene (SC).

```
typedef enum{NT,EQ,IS,SC} Tr;
Tr Triangle Type (int a, int b, int c)
{
if (((a+b) <= c) || ((b+c) <= a) || ((c+a) <= b)) return NT;
if (a == b) { if (b == c) return EQ; }
else (if (b != c) return SC ;
return IS; }
```

Define cyclomatic complexity. Derive a flow graph of the above function, compute cyclomatic complexity and apply basis path testing to develop test cases covering testing of all statements in the function. Execute the test cases showing input data combination, expected result and actual result.

(18)

- 4.**
- a) Explain the following concepts with suitable examples and reasoning: Quality, safety, reliability. Give reasons: Can a program be correct but still not reliable or not exhibit good quality?
  - b) What are interactions? What diagrams are used to show interactions?

**(10+8)**

- 5.**
- a) Consider an automatic coffee vending machine with (i) a numeric key pad to enter the number of cups required, (ii) a slot for entering cash, (iii) a slot for returning cash difference (if any) and (iv) an opening for collecting coffee in a cup. Model the machine using a state diagram using UML in which the machine may be in any of the following four states: waiting, receive cash, return cash and deliver coffee. Mention the activities in each state and actions during state transitions.
  - b) Write a use-case description for reading short-messages (sms) that your mobile phone receives.

**(12+6)**

- 6.**
- a) Give an architecture for a software system used to simulate an ant that will find and eat all the food in its environment represented by a grid 3m x 3m with grid cell size of 10cm x 10cm.
  - b) What are the different levels of testing? What are the goals of each level? For each level, specify which of the testing approaches (functional structural or some other) is more suitable.

**(10+8)**

- 7.**
- a) What are the characteristics of Component-based Software engineering?
  - b) How does component-based development take place?
  - c) What is a reusable component? Under what environmental conditions (software/hardware) these components can be reused?

**(3+6+9)**