Department of Computer Science and Engineering

National Institute of Technology Rourkela

End-Semester Examination (Spring Semester) - 2019

B.Tech. VIIIth Semester

Sub: Software Engineering (CS412)

Time – 3 Hours **Full Marks – 100**

Answer any five questions including Question 1.

1. **[2 x 10 = 20]**

(a) For which kind of problems, evolutionary model of software development is suitable? Give an example, with justification.

(b) Write any two attributes of a bad SRS document?

(c) Mention any two problems that can likely to occur if a module has low cohesion.

(d) Write down two important shortcomings of DFD as a tool for performing structured analysis.

(e) State whether of the following statement is true or false. Justify your answer.
An object-oriented design cannot be implemented using procedural programming language.

(f) What do you mean by aggregation relation among classes? Give a suitable example.

(g) What do you mean by "Direct Manupulation Interface"? What is the disadvantage of using it.

(h) Suppose a program contains 5 decision points. If there are 3 choices at each decision point, how many test cases are needed for branch testing?

(i) Explain using one simple sentence what you understand by the following reliability measures "MTBF of 200 units".

(j) The changes made to a software product to add some desired features can be considered as which type of maintenance? Justify your answer.

2. **[10+10=20]**

(a) Draw a labeled schematic diagram to represent the spiral model of software development and explain it. Is the number of loops of the spiral fixed? If your answer is affirmative, write down the number of the loops that the spiral has. If your answer is negative, explain how and on what basis the number of loops of the spiral can be determined.

(b) What are the important differences between a model-oriented specification method and a property-oriented specification method? Compare the relative advantages of property-oriented specification methods over model-oriented specification methods. Name at least one representative popular property-oriented specification technique, and one representative model-oriented specification technique.

3. Consider the following problem statement: **[5x4]**

The local newspaper and magazine delivery agency has asked you to develop a software for him to automate various clerical activities associated with his business. The requirements are briefly mentioned below:

- This software is to be used by the manager of the news agency and his delivery persons.
- For each delivery person, the system must print each day the publications to be delivered to each address.
- The customers usually subscribe one or more newspapers and magazines. Customer should be able to initiate new subscriptions and suspend subscription for a particular item either temporarily or permanently through a web browser. Considering large customer database, at least 10 concurrent customer accesses should be supported.
- For each delivery person, the system must print each day the publications to be delivered to each address.
- The system should also print for the news agent the information regarding who received what and a summary information of the current month.
- At the beginning of every month bills are printed by the system to be delivered to the customers. These bills should be computed by the system automatically.
- Customers may request to subscribe new newspapers/magazines, modify their subscriptions list, or stop their subscriptions altogether.
- Customers usually pay their monthly dues either by cheque or cash. Once the cheque number or cash received is entered in the system, receipt for the customer should be printed.
- If any customer has any outstanding due for one month, a polite reminder message is printed for him and his subscription is discontinued if his dues remain outstanding for the period of more than two months.
- The software should compute and print out the amount payable to each delivery boy. Each delivery boy gets 2.5 percent of the value of the publication delivered by him.

Construct the following UML diagrams for the above problem.

(i)Use Case Diagram

(ii) Class Diagram

(iii) Sequence Diagram for any one use case

(iv) State Machine Diagram for any one object

4. **[8+12=20]**

(a) What are the differences between a coding standard and a coding guideline? Why are formulation and use of suitable coding standards and guidelines considered important to a software development organization? Write down four important coding standards and coding guidelines that you would recommend.

(b) Explain the key respects in which testing of procedural and object-oriented programs differ. Do various object-oriented features make it easier to test object-oriented programs? Substantiate your answer with suitable examples.

5. **[10+10=20]**

(a) Explain five desirable characteristics that a good user interface should possess.

(b) What is a window management system (WMS)? Represent the main components of a WMS in a schematic diagram and briefly explain their roles.

6. **[8+12=20]**

(a) Design a black-box test suite for a program that accepts a pair of points defining a straight line and another point and a float number defining the center of a circle and its radius. The program is intended to compute their points of intersection and prints them.

(b) Write a C function for searching an integer value from a large sorted sequence of integer values stored in an array of size 100, using the binary search method.

(i)Build the control flow graph of your binary search function, and hence determine its cyclomatic complexity.

(ii) Identify the Linearly Independent paths in the control flow graph.

(iii) Design a test suite for testing your binary search function

7. **[8+12=20]**

(a) What do you understand by software reliability? Through a simple plot explain how the reliability of a software product changes over ìts lifetime. Draw the reliability change for a hardware product over its lifetime and explain why the two plots look so different.

(b) What do you mean by software quality? Why is it important for a software development organization to obtain ISO 9001 certification? With the help of suitable examples, discuss the types of software organizations to which ISO 9001, 9002, and 9003 standards respectively are applicable. Write down the shortcomings of ISO.

End