**C10-R4: SOFTWARE SYSTEMS**

**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) Define the following terms.
   i) Control hierarchy or program structure
   ii) Structural partitioning
   iii) Data structure
   iv) Software procedure

b) What do you understand by Measures, Metrics and Indicators? Briefly explain each term.

c) What are the fundamental differences between object oriented and function oriented design? Explain in brief.

d) Coupling means the interconnection of different modules with each other or the interrelationship of different modules of a system. What problems arise if two modules have high coupling?

e) Assessment of risks is very important in the design and development process of any software system. What are the three activities of risk assessment?

f) Choose the correct answer from the givens options.
   i) How is WINWIN Spiral Model different from Spiral Model?
      a) It defines tasks required to define resources, timelines, and other project related information.
      b) It defines a set of negotiation activities at the beginning of each pass around the spiral.
      c) It defines tasks required to assess both technical and management risks.
      d) It defines tasks required to construct, test, install, and provide user support.
   ii) Problems with using Lines of Code to measure the size of a product include(s)
      a) The creation of source code is only part of the development effort
      b) The Lines of Code (LOC) will differ between languages and cannot be measured for some languages
      c) Should comments, data definitions etc (i.e. non-executable LOC) be included as well?
      d) The final size (kLOC) can only be determined once the product is delivered
      e) All of the above.
   iii) Which configuration objects would not typically be found in the project database?
      a) Design Specification
      b) Marketing Data
      c) Executable Code
      d) Test Plans
      e) Test Procedures
   iv) Coupling is a qualitative indication of the degree to which a module
      a) Can be written more compactly
      b) Focuses on just one thing
      c) Is able to complete its function in a timely manner
      d) Is connected to other modules
      e) Is able to complete its logic in a timely manner.

g) Choose the correct answer from the givens options.
   i) Rapid Application Development (RAD) is a software development methodology that uses minimal planning in terms of software prototyping. RAD is not appropriate when?
      a) Fast finding already done
      b) Technical risks are high
      c) Testing is not needed
      d) None of the above
   ii) Traditionally, the phase of software development where a formal approach used is
      a) Programming

b) Design
c) Requirements
d) Planning
e) Testing

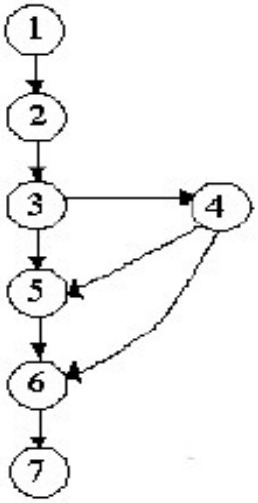
iii) Which among the following measures how strongly the elements within a module are related?
a) Coupling
b) Cohesion
c) Aggregation
d) Inheritance
e) Abstraction

iv) Which tests are designed to confront the program with abnormal situations?
a) Recovery Testing
b) Security Testing
c) Stress Testing
d) Performance Testing
e) Usage Testing

**(7x4)**

**2.**

a) For the flow graph shown in the figure below:
i) Compute the McCobe's Cyclomatic Complexity
ii) Find out independent paths




b) Why is maintenance of a software important? Discuss some of the problems that are faced during maintenance of software.

c) How does the risk factor affect the spiral model of software development?

**(8+6+4)**

**3.**

a) What are the generic components of Object Oriented Analysis Model? Briefly explain Class-Responsibility-Collaborator (CRC) Modeling? What are the criteria for the inclusion of a Class on a CRC Card?

b) Draw the use case diagram for, Time and Resource Management System (State necessary assumptions considered for your use case diagram).

**(12+6)**

**4.**

a) Distinguish software faults and software failures.

b) Briefly explain, why the architecture of software is very important?

c) Why is SRS also known as the black-box specification of system?

**(6+6+6)**

**5.**

a) What are the various options to construct a class? Give example of each option. What the advantages are of object oriented architecture?

b) What are the data design principles to be remembered while designing a data centric software system?

c) Differentiate between functional testing and structural testing.

**(8+6+4)**

**6.**

a) What problems arise if two modules have high coupling?

b) Draw E-R diagram for the following situation:
An account is a relationship between customer and bank. A customer has a name.
A bank has a branch. A customer may have several accounts of different type and balance.

c) Define the following:
   i) Aggregation among objects
   ii) Class
   ii) Repeated inheritance
   iii) Encapsulation

**(4+10+4)**

**7.**

a) Define capability. What are the quantities that determine the degree of capability of a software reliability model?

b) Explain Equivalence Class Partitioning and Boundary value analysis. Compare the two.

c) Why does the software design improve when we use object-oriented concepts?

d) Explain the concept of bottom-up, top-down and hybrid design.

**(2+6+4+6)**