Indian Institute of Technology Roorkee

Department of Computer Science and Engineering

End-Term Examination, B.Tech. II (CSE) April-May, 2024

Software Engineering (CSN-254)

Maximum Marks: 50 **Time Allowed: 3 Hours**

Read the following instructions carefully:
1. Attempt ALL questions.
2. Attempt all parts of a question together. Attempt questions in the same order as given in the question paper. Follow this instruction strictly.
3. In addition to correctness of answer, the quality of the answer will also be considered during evaluation.

Question 1

With reference to white box testing and black box testing, answer the following questions. Show steps of your computations. Also, provide proper justification of your answer and explanations based on **standard principles** of Software Engineering.

(a) Consider a software that takes a character string of upto 1 to 35 characters in length and checks whether the string is a palindrome. [2+2+2= 6 Marks]

i) **Specify** equivalence classes and the corresponding **test suite** for this problem for equivalence class partitioning based testing. Give proper **description** for each part of your answer.

ii) **Specify test suite** for this problem for boundary value analysis based testing. Give proper **description** for each part of your answer.

(b) Consider a program with N decision points, each of which has two branches. Minimum of **how** many test cases are necessary for branch testing? **Show** proper computation and justification. [2 Marks]

(c) For a program containing N binary branches, Minimum of **how** many test cases are necessary for path coverage? **Show** proper computation and justification. [2 Marks]

(d) Consider a scenario where two programmers have written two different programs for a same programming problem. **How** can you compare the path testing effort for these two programs? **Explain.** [2 Marks]

Question-2

(a) Due to some change requirements, a software need to be modified. The maintenance team manager assessed it for maintenance and observed following: [6 Marks]

- Amount of rework required is high with estimated rework of 40%.
- Product is exhibiting high failure rate.
- Existing software artifacts are difficult to understand.

Describe the **standard and suitable** maintenance process that should be followed for performing this activity. **Explain** with the help of **diagrams**. Diagrams should be properly annotated and self-explanatory showing all the steps involved. The process and diagram should show reuse from existing code and other artifacts. Please note that you need to specify standard and suitable process, any adhoc method or minimally usable method cannot be considered.

(b) In the coding phase, code inspection and code walkthrough are two important activities. Specify the **differences** between the procedure of both. Only **significant** points will be considered. [2 Marks]

(c) With reference to software testing, **differentiate** between the purpose of verification and validation. Only **significant** points will be considered. [2 Marks]

(d) **How** cohesion and coupling in the design of a system dependent on the modular structure of the system? Explain your answer. Also specify, **which** type of modular structure is preferred in terms of cohesion and coupling? [2 Marks]

Question-3

a) Give an **example to show** and **explain**, how by modifying logic, you can change from stamp coupling to data coupling between two functions. [3 Marks]

b) **How** an object oriented system design uses function oriented design implicitly? Give an **example** and **explain**. [3 Marks]

c) **Which** drawback of COCOMO-I model is handled by COCOMO-II model? **Specify** in detail. For a given software 'Soft', given the following information, **calculate the estimated efforts** in person-months using the Application Composition Model of COCOMO-II. **Show all steps of calculation along with corresponding formulae used. Also show the impact of increasing reuse on estimated efforts.**

[7 Marks]

- From analysis of SRS documents, following information is estimated:

Object Type	Number of Objects	Complexity level weights
Screens	*5*	*2*
Screens	*3*	*3*
Reports	*3*	*5*
Reports	*6*	*2*
Components	*4*	*10*

- Given that the estimated reuse percentage is 40.
- Based on developer experience and development environment maturity, the estimated productivity rate is 13.

Question-4

a) **How** the software quality system has evolved from product assurance to process assurance? **Explain** each stage in detail. [4 Marks]

b) In terms of Software Configuration Management, **Define** Software Configuration? **Specify** any two configuration items. **Explain** the step-wise-step process of Software Configuration Management with the help of a **diagram.** [4 Marks]

c) **Draw** the layered architecture of CASE environment model? **Why** CASE environment is considered more useful than the disintegrated CASE tools in the industrial setup? [3 Marks]

d) **Specify** the template of Software Requirement Specification Document as per IEEE-830 standard? [2 Marks]