(2½ Hours) **[Total Marks: 75]**

N. B.: (1) **All** questions are **compulsory**.
(2) Make **suitable assumptions** wherever necessary and **state the assumptions** made.
(3) Answers to the **same question** must be **written together**.
(4) Numbers to the **right** indicate **marks**.
(5) Draw **neat labeled diagrams** wherever **necessary**.
(6) Use of **Non-programmable** calculators is **allowed**.

1. Attempt *any three* of the following: **15**

a. What are the core components of quality? Briefly explain each with an example.
b. Explain the key principles of Total Quality Management (TQM). How do these principles support organizational improvement?
c. Explain the major constraints in assessing software product quality. How can these affect quality measurement?
d. Identify and explain three problematic areas in the software development life cycle that often lead to quality issues.
e. What is Statistical Process Control (SPC), and how is it used to manage quality?
f. What role do customers and suppliers play in a quality management system? Explain using the process approach.

2. Attempt *any three* of the following: **15**

a. What is software testing? Why is testing considered a necessary activity in the software development lifecycle?
b. Define the terms defect, error, and mistake in the context of software testing. How do they differ?
c. Explain how testing is integrated into different stages of the software development life cycle.
d. What are the principles of software testing? Discuss any five with examples.
e. What is mutation testing? Explain its purpose and advantages.
f. What are the common misconceptions about software testing? How can these misconceptions impact the process?

3. Attempt *any three* of the following: **15**

a. What is Random Testing in unit testing? How does it complement boundary value testing?
b. Differentiate between Normal, Robust, and Worst-Case Boundary Value Testing. Provide examples for each.
c. Differentiate between Traditional and Improved Equivalence Class Testing with suitable examples.
d. What is a Decision Table? How is it used in software testing? Give an example.
e. What is Define/Use Testing in data flow testing? Illustrate with an example.
f. Define DD-Paths. How are they useful in path testing and coverage analysis?

4. Attempt *any three* of the following: **15**

a. Differentiate between verification and validation in software engineering. Provide examples for each.
b. Discuss the different types of reviews based on the software development stage. Provide suitable examples.
c. Compare the roles of verification and validation activities in ensuring software quality.
d. What is the V-Model in software development? How does it differ from the traditional waterfall model?
e. What are the critical roles and responsibilities in the V&V model? Explain with respect to various stakeholders.
f. What is meant by "coverage in verification"? How is it measured and ensured?

5. Attempt *any three* of the following: **15**

a. Explain the different levels of software testing and their significance in the software development life cycle.
b. What is integration testing? Compare Big Bang Testing and Sandwich Testing approaches.
c. What are the key features of software testing tools? Explain why these features are important.
d. What are the advantages and disadvantages of using automated testing tools?
e. What are source code testing tools? How do they help improve software quality?
f. Explain the 'Critical Path First' approach in integration testing. Why is it important?

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