

SOFTWARE ENGINEERING
(MCAP 2201)

Time Allotted : 3 hrs

Full Marks : 70

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**
- (i) What is the main goal of professional software development?
 - (a) Deliver a functional product
 - (b) Deliver a product on time
 - (c) Deliver a product on budget
 - (d) Deliver a high-quality product while meeting deadlines and staying within budget.
 - (ii) What is the software process model?
 - (a) A framework for software development activities
 - (b) A model of software design principles
 - (c) A model of software security practices
 - (d) A model of software development technologies.
 - (iii) What is the rational unified process?
 - (a) A software development process model
 - (b) A process for system engineering
 - (c) A process for system procurement
 - (d) A process for system operation.
 - (iv) Which of the following is NOT a key characteristic of professional software development?
 - (a) Communication
 - (b) Planning
 - (c) Quality assurance
 - (d) Hacking.
 - (v) Which of the following is NOT a common ethical concern in software engineering?
 - (a) Privacy
 - (b) Security
 - (c) Accountability
 - (d) Profit maximization.

- (vi) What is the difference between functional and non-functional requirements?
 - (a) Functional requirements describe what the system should do, while non-functional requirements describe how it should do it
 - (b) Functional requirements describe how the system should do it, while non-functional requirements describe what it should do
 - (c) Functional requirements are specific to the user, while non-functional requirements are specific to the system
 - (d) None of the above.
- (vii) What is the purpose of the software requirements document?
 - (a) To provide a high-level overview of the system's functionality
 - (b) To describe the technical architecture of the system
 - (c) To provide detailed descriptions of the system's requirements
 - (d) To provide a roadmap for the development team.
- (viii) What is the difference between verification and validation?
 - (a) Verification checks if the software meets its specifications, while validation checks if it meets the user's needs
 - (b) Verification checks if the software meets the user's needs, while validation checks if it meets its specifications
 - (c) Verification and validation are the same thing
 - (d) None of the above.
- (ix) What is the difference between an error, a fault, a bug, and a failure?
 - (a) An error is a mistake made by a programmer, a fault is a defect in the software, a bug is an error in the code, and a failure is when the software does not behave as expected
 - (b) An error is a defect in the software, a fault is an error in the code, a bug is a mistake made by a programmer, and a failure is when the software does not behave as expected
 - (c) An error is when the software does not behave as expected, a fault is a mistake made by a programmer, a bug is an error in the code, and a failure is a defect in the software
 - (d) None of the above.
- (x) Which of the following is a goal of software testing?
 - (a) To find as many defects as possible
 - (b) To ensure that the software meets its specifications
 - (c) To ensure that the software meets the user's needs
 - (d) All of the above.

Group- B

- 2. (a) Explain the different stages of Product Life Cycle (PLC) with their remedial measures. [[C01](Understand/LOCQ)]
- (b) Illustrate the basic advantages and disadvantages of SCRUM model over other models of Agile methodologies. [[C01](Understand/LOCQ)]

6 + 6 = 12

3. (a) Illustrate the different frameworks of Rational Unified Process (RUP).
[[CO1](Understand/LOCQ)]
(b) Compare and contrast the Crystal methodology, FDD methodology, DSDM methodology and Lean software development methodology.
[[CO1](Understand/LOCQ)]
4 + 8 = 12

Group - C

4. (a) Briefly focus COCOMO estimation model and the basic differences between COCOMO and COCOMO II model.
[[CO1](Analyze/IOCQ)]
(b) Given the following values, calculate the FP when the complexity adjustment factors are significantly complex and weighting factors are high (i.e. 6,7,6,15,10 respectively). user input = 55, user output = 35, user enquiries = 40, user files = 8, external interfaces = 5.
[[CO5](Apply/IOCQ)]
(4 + 2) + 6 = 12
5. (a) Construct the functional and non-functional requirements of developing a software project to build up “Virtual Class Room System”.
[[CO2](Analyze/IOCQ)]
(b) Use COCOMO-II model to estimate the effort required to build software for simple ATM that produces 12 screens with 2 views each for 3 data base tables(1 server side,2 client side), 10 reports with 2 section each for 3 data base tables (1 server side, 2 client side) and will require approximately 80% as new components. Assume nominal complexity and nominal developer/environment maturity. Use application composition model with object point.
[[CO5](Apply/IOCQ)]
6 + 6 = 12.

Group – D

6. (a) Compare and contrast between architectural patterns and design patterns.
[[CO3](Understand/LOCQ)]
(b) Assess the impact of architectural patterns on software quality attributes such as maintainability and scalability.
[[CO3](Evaluate/HOCQ)]
6 + 6 = 12
7. (a) Evaluate the effectiveness of using design patterns in improving software quality.
[[CO3](Evaluate/HOCQ)]
(b) Develop a UML Class diagram for a library management system.
[[CO3](Create/HOCQ)]
6 + 6 = 12

Group - E

8. (a) Describe a situation where integration testing might be necessary.
[[CO4](Analyse/IOCQ)]

- (b) Develop a control flow graph for a binary search problem. Also calculate the cyclomatic complexity of the program. [[C03,C04](Applying/IOCQ)]
4 + (4 + 4) = 12
9. (a) Design a test scenario using Cause-Effect Graphing for an e-commerce website that sells clothes. [[C04](Apply/IOCQ)]
- (b) Explain the McCall's quality factors. How they relate to software quality? [[C04](Understand/LOCQ)]
8 + (2 + 2) = 12
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<i>Cognition Level</i>	<i>LOCQ</i>	<i>IOCQ</i>	<i>HOCQ</i>
<i>Percentage distribution</i>	<i>35.41</i>	<i>45.83</i>	<i>18.75</i>

Course Outcome (CO):

After the completion of the course students will be able to

1. Exemplify the software engineering process, systems and security
2. Explain software engineering process by identifying the requirements and system modelling.
3. Design, develop and implement software based on requirement.
4. Illustrate the evolution process, reuse and testing for developing a quality software for customer.
5. Describe the software management, project management, and planning and configuration Management.

**LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question*