

**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) Which of these software engineering activities are not a part of software processes?  
 (a) Software dependence (b) Software development  
 (c) Software validation (d) Software specification.
- (ii) The fundamental notions of software engineering does not account for \_\_\_\_\_.  
 (a) software processes (b) software security  
 (c) software reuse (d) software validation.
- (iii) QFD stands for  
 (a) quality function design (b) quality function development  
 (c) quality function deployment (d) none of the mentioned.
- (iv) What is the major advantage of using Incremental Model?  
 (a) Customer can respond to each increment  
 (b) Easier to test and debug  
 (c) It is used when there is a need to get a product to the market early  
 (d) Easier to test and debug and it is used when there is a need to get a product to the market.
- (v) Choose the incorrect statement with respect to Non-Functional Requirement (NFR).  
 (a) Product-oriented Approach – focus on system (or software) quality  
 (b) Process-oriented Approach – focus on how NFRs can be used in the design process  
 (c) Quantitative Approach – find measurable scales for the functionality attributes  
 (d) Qualitative Approach – study various relationships between quality goals.

- (vi) Which one of the following is not a step of requirement engineering?  
 (a) Elicitation (b) Design  
 (c) Analysis (d) Documentation.
- (vii) Which of the following is not an activity of Structured Analysis (SA)?  
 (a) Functional decomposition  
 (b) Transformation of a textual problem description into a graphic model  
 (c) All the functions represented in the DFD are mapped to a module structure  
 (d) all of the mentioned.
- (viii) Choose the suitable options with respect to regression testing.  
 (a) it helps in development of software  
 (b) it helps in maintenance of software  
 (c) it helps in development and maintenance of software  
 (d) none of the mentioned.
- (ix) ISO 9001 is not concerned with \_\_\_\_\_ of quality records.  
 (a) collection (b) maintenance  
 (c) verification (d) dis-positioning.
- (x) In which test design each input is tested at both ends of its valid range and just outside its valid range?  
 (a) Boundary value testing  
 (b) Equivalence class partitioning  
 (c) Boundary value testing and equivalence class partitioning  
 (d) Decision tables.

**Group - B**

2. (a) Describe about agile modelling in detail.  
 (b) Explain the component-based software development model with a neat sketch. **6 + 6 = 12**
3. (a) Classify the following as functional/non-functional requirements for a banking system:  
 (i) Verifying bank balance  
 (ii) Withdrawing money from bank  
 (iii) Completion of transactions in less than one second  
 (iv) Extending the system by providing more tellers for the customers.
- (b) What is requirement elicitation? Briefly describe the various activities performed in requirements elicitation with an example of a watch system that facilitates to set time and alarm and assess. **(1 + 1 + 1 + 1) + 8 = 12**

**Group – C**

4. (a) Compare size oriented and function-oriented metrics for software cost estimation.
- (b) Consider a project to develop a full screen editor. The major components identified are (i) screen edit, (ii) command language interpreter (iii) file input and output (iv) cursor movement and (v) screen movement. The sizes for these are estimated to be 3K, 2K, 1K, 2K, 4K lines of code. Use COCOMO model to determine:
- (i) overall cost and schedule estimates (values for cost driver RELY (1.15), CPLX (1.15), ACAP (0.86), all other are nominal).
- (ii) cost and schedule for different phases. (values for  $\mu_p$  for different phases are 0.06, 0.16, 0.26, 0.42, 0.16 respectively and values for  $\zeta_p$  for different phases 0.10, 0.19, 0.24, 0.39, 0.18 respectively).

**4 + 8 = 12**

5. (a) Distinguish between transform flow and transaction flow.
- (b) Explain about software architecture design, with emphasize as fan in, fan-out, coupling, cohesion and factoring.

**4 + 8 = 12****Group – D**

6. (a) Compare functional and behavioural models.
- (b) A friend offers to play one of the two betting games with you. Game X is that you toss a coin twice. He pays you Rs.10 if you get two heads. You pay him Rs.2 for each tail you toss. Game Y is that you also toss a coin twice, but it costs you Rs.2 to play and he pays you Rs.10 if you get two heads. Which game should you play? Draw a decision tree for the problem.

**4 + 8 = 12**

7. (a) Discuss the differences between function oriented and object-oriented design.
- (b) Represent the following relations among the classes using UML diagram.
- (i) An order consists of one or more items. Each order item contains the name of the item, its quantity and date by which it is required. Each order item is described by an item type

- specification object having details such as its vendor addresses, its unit price and the manufacturer.
- (ii) Bill contains number of items. Each item describes some commodity, the price of unit and total of this price.

**6 + 6 = 12****Group – E**

8. (a) Differentiate verification and validation. Which type of testing address verification? Which type of testing address validation?
- (b) Consider the following program segment.
- ```
/*num is the number of function searches in a pre-sorted integer array arr */
int bin_search(int num)
{
  int min , max; min=0; max=100;
  while(min!=max) {
    if(arr[(min+max)/2]>num)
      max=(min+max)/2;
    else if(arr[(min+max)/2]
      min=(min+max)/2;
    else return((min+max)/2);
  }
  return(-1);
}

```
- (i) Draw the control flow graph for this program segment.
- (ii) Determine the cyclomatic complexity for this program. (Show the intermediate steps in your computation. writing only the final result is not sufficient).

**4 + (4 + 4) = 12**

9. (a) Discuss the different levels in CMM.
- (b) What is boundary value analysis? Explain the technique specifying rules and its usage with the help of an example.

**6 + 6 = 12**