

SOFTWARE ENGINEERING AND PROJECT MANAGEMENT (INFO 3103)

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) Decomposition of a bubble should be carried till _____
 - (a) the atomic program instructions are reached
 - (b) two levels
 - (c) a level is reached at which the function of the bubble can be described using a simple algorithm
 - (d) none of the above.
 - (ii) The primary purpose of risk management is

(a) risk containment	(b) risk assessment
(c) risk identification	(d) all of the above.
 - (iii) Structured analysis technique is based on

(a) top-down decomposition approach	(b) bottom-up approach
(c) divide and conquer principle	(d) both (a) and (c).
 - (iv) A type of failures that occurs for all input values while invoking a function of the system is

(a) transient failure	(b) permanent failure
(c) recoverable failure	(d) unrecoverable failure.
 - (v) Reengineering is preferable for which of the software products?
 - (a) Software products exhibiting high failure rates
 - (b) Software products having poor design
 - (c) Software products having poor code structure
 - (d) All of the above.
 - (vi) Which of the following UML diagrams has a static view?

(a) Collaboration	(b) Use case
(c) State chart	(d) Activity.

- (vii) In function point analysis, number of complexity adjustment factors is

(a) 10	(b) 14	(c) 15	(d) 16.
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- (viii) Swimlane is defined in

(a) state chart diagram	(b) activity diagram
(c) use case diagram	(d) sequence diagram.
- (ix) Interaction diagram is a combined term for
 - (a) sequence diagram + collaboration diagram
 - (b) activity diagram + state chart diagram
 - (c) deployment diagram + collaboration diagram
 - (d) none of the mentioned.
- (x) Schedule slippage is a type of

(a) business risk	(b) project risk
(c) technical risk	(d) none of the above.

Group - B

2. (a) Write down the disadvantages of waterfall model. Identify at least two activities carried out during each phase of a spiral model.
 (b) What is data dictionary? Give an example to explain your answer.
 (c) Explain the role of a system analyst.
(2 + 1) + (2 + 3) + 4 = 12
3. (a) Explain balancing of DFD with suitable example.
 (b) Draw a DFD (up to 2nd level) for a typical hotel management system. You must include at least three modules/sub processes in level-1 DFD.
(2 + 3 + 3) + 4 = 12

Group - C

4. (a) Write a short note on black box testing. Explain the important coding standards and guidelines.
 (b) Do you agree with the statement: "The effectiveness of a testing suite in detecting errors in a system can be determined by examining the number of test cases in the suite"? Justify your answer.
(5 + 4) + 3 = 12
5. (a) What do you understand by performance testing? Explain the different types of performance testing. Why is boundary value analysis very important for designing the black box test suite of a problem?

- (b) Draw the control flow graph for the following function named find-maximum. From the control flow graph, determines its cyclomatic complexity.

```
int find-maximum(int i, int j, int k)
{
    int max;
    if(i>j) then
        if(i>k) then max = i;
        else max = k;
    else if(j>k) max = j;
    else max = k;
    return(max);
}
```

$$(1 + 4 + 2) + (3 + 2) = 12$$

Group - D

6. (a) Why is COCOMO called a heuristic model? Assume that the size of an embedded type software product has been estimated to be 32,000 lines of source code. Assume that the average salary of software engineers is Rs.15,000/- per month. Determine the effort required to develop the software product and the nominal development time.
- (b) Plot (i) Estimated Effort vs Product Size (ii) Development Time vs Product Size for different types of projects as used in COCOMO model. Find the viability of a project if the probability of occurrence of a risk is 80% and cost to complete the project is Rs.10,000/- .

$$(1 + 3) + (4 + 4) = 12$$

7. (a) Draw the PERT diagram and Gantt chart for the given set of subtasks and dependencies. Show the critical paths involved in Gantt chart. Assume start time = 0.

Subtask	Time to complete	Dependencies
1	8	-----
2	10	-----
3	8	1, 2
4	9	1
5	5	2
6	3	3, 4
7	2	4, 5
8	4	6, 7
9	3	5, 6

- (b) What is an activity network model?

$$(2 + 3 + 4) + 3 = 12$$

Group - E

8. (a) Write the difference between include and extend relationship used in UML diagram (with example). What is the difference between an operation and a method in the context of object-oriented design technique?
- (b) How is a UML use case diagram different from a traditional flow chart? Write down different components required to draw class diagram.
9. (a) Draw the activity diagram for an online job portal in which job seekers log into the system, then they can view the current job (by location, by job nature, by qualification). After that they can apply for a suitable job. System must send an acknowledgement after successful application. Different employers also can log into the system and then they can request to admin to post different new jobs. You must include different states, special states, decision point, fork and join.
- (b) Represent the following relations among classes using UML diagram.
- Students have five courses in each semester. Each course is taught by one or more teachers.
 - Bill contains number of items. Each item defines some commodity, and price per unit.
 - An order consists of one or more order items. Each order item contains the name of the item, its quantity and its delivery date. Each order item is described by an item type specification object providing details such as its vendor addresses, its unit price, and the name of manufacturer.

$$6 + 6 = 12$$