

**SOFTWARE ENGINEERING
(INFO 3104)**

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 the following testing is also known as white-box testing?
(a) Structural testing (b) Error guessing technique
(c) Design based testing (d) None of the above.
- (ii) After which phase, we can proceed to the white box testing?
(a) After the coding phase (b) After designing phase
(c) After SRS creation (d) After the installation phase.
- (iii) Identify the fault-based testing technique.
(a) Beta testing (b) Unit testing
(c) Mutation testing (d) Stress testing.
- (iv) Cyclomatic complexity is done for
(a) Black box testing (b) White box testing
(c) Grey box testing (d) All of the above.
- (v) What is a Functional Requirement?
(a) Specifies the tasks the program must complete
(b) Specifies the tasks the program should not complete
(c) Specifies the tasks the program must not work
(d) All of the mentioned.
- (vi) Which one of the following statements best defines the term failure?
(a) A human action that produces an incorrect result
(b) Its departure from specified behavior
(c) Found in the software; the result of an error
(d) It is procedure or data definition in a computer database.
- (vii) Engineers developing software should not
(a) be dependent on their colleagues
(b) maintain integrity and independence in their professional judgment
(c) not knowingly accept work that is outside your competence
(d) not use your technical skills to misuse other people's computers.

- (viii) _____ is not among the eight principles followed by the Software Code of Ethics and Professional Practice.
(a) Product (b) Environment (c) Public (d) Profession
- (ix) Adaptive Software Development (ASD) has which of the following three framework activities?
(a) Speculation, collaboration, learning
(b) Analysis, design, coding
(c) Requirements gathering, adaptive cycle planning, iterative development
(d) All of the mentioned.
- (x) Quality Management is known as _____
(a) SQI (b) SQA (c) SQM (d) SQA and SQM.

Group- B

2. (a) Explain software engineering and software engineering layers. [(CO1)(Remember/LOCQ)]
(b) Explain the umbrella activities of a software process. [(CO1)(Understand/LOCQ)]
6 + 6 = 12
3. (a) Draw a DFD for railway reservation system. Clearly describe the working of the system. [(CO2)(Analyze/IOCQ)]
(b) Discuss about the various drawbacks of spiral model. [(CO2)(Understand/LOCQ)]
8 + 4 = 12

Group - C

4. (a) Analyze class diagram with example. [(CO3)(Analyze/IOCQ)]
(b) Explain sequence and activity diagram with example. [(CO3)(Apply/IOCQ)]
6 + 6 = 12
5. (a) Consider the following shopping portal:
A customer visits the online shopping portal. A customer may buy item or just visit the page and logout. The customer can select a segment, then a category and brand to get different products in the desired brand. The customer can select product for purchasing. The process can be repeated for more items. Once the customer finishes selecting product/s the cart can be viewed. The cart can be edited. For the final payment the customer has to login. If the customer is first time user he must register with portal. Finally cart is submitted for payment and card details, addresses are to be confirmed by customer. Customer gets a confirmation with shipment ID and delivery of goods within 7 days. Draw a use case diagram for the above case study. [(CO4)(Apply/IOCQ)]
(b) Define an Object. Illustrate the probable attributes that will be modelled in a library database for the object BOOK. [(CO3)(Evaluate/HOCQ)]
6 + 6 = 12

Group - D

6. (a) Consider a simple program to classify a triangle. Its inputs is a triple of positive integers (say x, y, z) and the data type for input parameters ensures that these will be integers greater than 0 and less than or equal to 100. The program output may be one of the following words:
[Scalene; Isosceles; Equilateral; Not a triangle]
Design the boundary value test cases. [[CO4](Apply/IOCQ)]
- (b) "A larger test suite does not always guarantee better detection of errors" - Justify with example. [[CO4](Analyze/IOCQ)]
- (c) Define the terms Mistake, Fault and Failure. Specify the relationship between them. [[CO4](Understand/LOCQ)]
- 5 + 3 + (3 + 1) = 12**
7. (a) Answer the following.
- (i) Suppose a program contains N decision points, each of which has two branches. How many test cases are necessary for branch testing? [[CO4](Apply/IOCQ)]
- (ii) If there are M choices at each decision point, how many test cases are needed for branch testing?
- (iii) For a program containing N binary branches how many test cases are necessary for path coverage? [[CO4](Apply/IOCQ)]
- (b) Explain the role of *Stub* and *Driver* in the context of unit testing. What is the basic idea behind statement coverage based testing? [[CO4](Understand/LOCQ)]
- (c) Distinguish between software verification and software validation. In which phase(s) of the SDLC are the verification and validation activities performed? [[CO4](Understand/LOCQ)]
- 3 + (2 + 2 + 1) + (2 + 2) = 12**

Group - E

8. (a) Suppose that an embedded project has 500 function points. Assume that on average one function point generates 53 lines of java code but 97 lines of C code. Use intermediate COCOMO model to calculate effort and duration required to develop in Java and in C. If java is chosen, the values of COCOMO parameters are: MODP = 1.10, ACAP = 1.05 and VEXP = 1.05, with all other parameters being 1.00. If C is used, all parameter values are 1.00 except AEXP and LEXP which are both 0.95 and ACAP is 0.90. [[CO5](Apply/IOCQ)]

<i>Intermediate COCOMO Model</i>			
Class	a	b	c
Organic	3.2	1.05	0.38
Semi-detached	3.0	1.12	0.35
Embedded	2.8	1.20	0.32

- (b) Give an outline of step wise planning activities for a project with neat diagram.
[[CO6)(Analyse/Create/IOCQ/HOCQ)]
8 + 4 = 12
9. (a) Compute and prepare function point value for a project with the following information domain characteristics.
Number of external inputs - 30
Number of external outputs - 52
Number of external inquiries - 22
Number of logical files - 12
Number of external interface files - 2
Assume complexity adjustment values for the above are average (4, 5, 4, 10, 7 respectively).
[[CO5)(Create/HOCQ)]
- (b) Calculate the ROI for a software project development, where the net profit is 60,000 and the total investment is 300,000.
[[CO5)(Analyze/IOCQ)]
8 + 4 = 12
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Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	25	50	25

Course Outcome (CO):

After the completion of the course students will be able to

INFO 3104.CO1: Prepare software requirement specifications as per IEEE guidelines.

INFO 3104.CO2: Model function-oriented software systems using DFD.

INFO 3104.CO3: Develop object-oriented software systems using ERD, UML.

INFO 3104.CO4: Analyze different approaches of testing methodology in software system.

INFO 3104.CO5: Estimate software size using Function Point Analysis.

INFO 3104.CO6: Work out software project schedule and staffing plan.

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