

SOFTWARE ENGINEERING
(CSEN 3201)

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 is not a characteristic of Extreme Programming?
 - (a) Complete planning before start of development
 - (b) Small releases
 - (c) Test-driven development
 - (d) Continuous integration.
 - (ii) SEMAT is
 - (a) A programming language
 - (b) One of the earliest software development methodologies
 - (c) A relatively recent perspective on redefining software engineering
 - (d) A software development organisation.
 - (iii) Which diagram is used to model object interactions arranged in chronological order?
 - (a) Sequence Diagram
 - (b) Use-case Diagram
 - (c) Context Diagram
 - (d) Activity Diagram.
 - (iv) The idea behind use cases is to capture
 - (a) various types of users who will be using the system
 - (b) various ways in which users can use the system
 - (c) user preferences for future system features
 - (d) all of the above.
 - (v) From functional strength point of view the worst type of cohesion is
 - (a) Coincidental
 - (b) Logical
 - (c) Functional
 - (d) Sequential.
 - (vi) Two modules are said to be highly coupled when they have
 - (a) control coupling
 - (b) content coupling
 - (c) data coupling
 - (d) stamp coupling.

- (vii) The full form of UML is
(a) United Modelling Language (b) Unified Measuring Language
(c) Unified Modelling Language (d) Unique Modelling Language.
- (viii) Third quadrant in spiral model is where
(a) customer evaluation is done (b) actual development is done
(c) coding is done (d) design is done.
- (ix) Boundary Value analysis is followed during the
(a) White box testing (b) Black box testing
(c) Verification (d) None of these.
- (x) The process of determining whether a fully developed software system conforms to its requirement specifications is called
(a) Verification (b) Validation
(c) Confirmation (d) Approval.

Group - B

2. (a) "The Waterfall model is no longer used in large scale software development." Is this a correct statement? If you say yes, justify your answer in no less than four sentences. If you say no, justify your answer in no less than four sentences.
[[CO2](Evaluate/HOCQ)]
- (b) What are the principal activities that are carried out in the software development life cycle? During which of one these activities do the development team need to be most closely involved with the users, and why?
[[CO1](Apply/IOCQ)]
- (c) Mention four foundational principles of the Agile philosophy of software development and describe each principle in one sentence.
[[CO2](Understand/IOCQ)]
4 + (3 + 1) + 4 = 12
3. (a) What are non-functional requirements and why are they important? Explain with examples three non-functional requirements. [[CO1](Remember/LOCQ)]
- (b) Identify the categories of external interface requirements listed in the IEEE Software Requirements Specifications Template. [[CO1](Understand/LOCQ)]
- (c) Where is the name "DevOps" derived from? What is DevOps? [[CO4](Analyse/IOCQ)]
(1 + 3) + 4 + 4 = 12

Group - C

4. (a) What do you mean by Cohesion? Briefly explain any two types of Cohesion with example(s). [[CO2](Understand/LOCQ)]
- (b) What is Coupling? Briefly explain any two types of Coupling with example(s).
[[CO2](Understand/LOCQ)]
(2 + 4) + (2 + 4) = 12
5. (a) Identify at least three reasons in favor of why functional independence is the key factor for a good software design.
(CO2)(Apply/IOCQ)

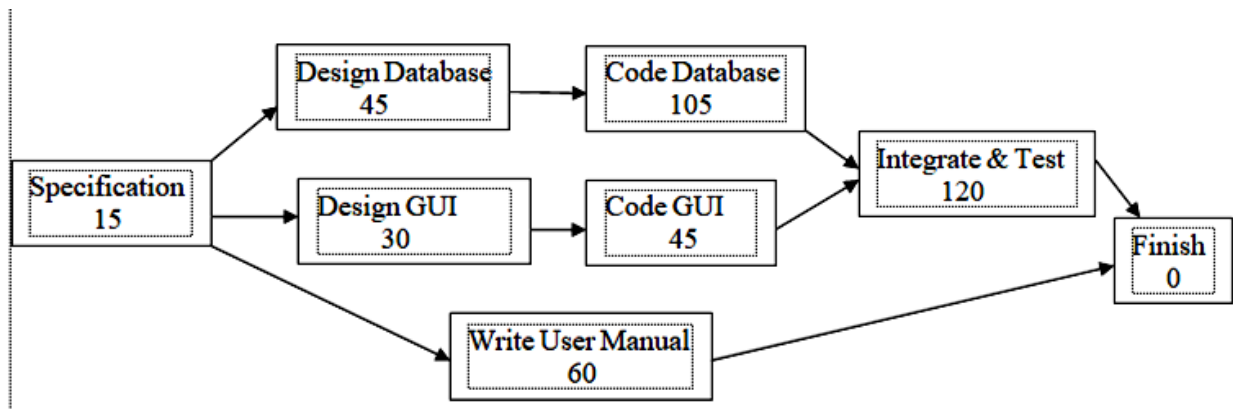
- (b) With suitable example explain the differences between aggregation and composition. *(CO2)(Apply/IOCQ)*
- (c) With an example show how “inheritance” is represented in a Class Diagram. *(CO2)(Remember/LOCQ)*
- (d) Identify the actors and use cases for the problem statement stated below. The draw the use case diagram for the given problem:
The CSE students and Faculty use the Library System. The Library contains books and journals. Books can be issued to both the Students and Faculty. Journals can only be issued to the Faculty. The Librarian can only issue books and Journals. The deputy-Librarian is In-charge of receiving the Returned Books and Journals. Each student is provided with three Library cards for using the facilities of the Library. Students can be issued only three books on their available cards at a time. On the issue of the books the Librarian specifies a date on which the students are expected to return the book. In case they are unable to do so, they will be charged with a fine of Rs 2 per day. The Accountant is responsible for receiving the fine for over-due books. Each Faculty is provided with a Library member ID. Faculties can be issued a maximum of five books at a time. The issue of Journals and Books to the Faculties is also performed in the same manner. Faculties are not charged with any fine. *(CO2)(Design/HOCQ)*
- 3 + 2 + 1 + 6 = 12**

Group - D

6. (a) What are the differences between code review and code walkthrough? *[[CO3)(Remember/LOCQ)]*
- (b) What is a failure? What is a test case? What is a test suite? *[[CO3)(Remember/LOCQ)]*
- (c) Differentiate between verification and validation. Is exhaustive testing of any non-trivial software system possible? Justify your answer. *[[CO3)(Analyse/IOCQ)]*
- 4 + (1 + 2 + 1) + (2 + 2) = 12**
7. (a) In the context of software testing, what is the use of a stub and a driver? What are the three main levels of testing of a software system is usually subjected to? *[[CO3)(Remember/LOCQ)]*
- (b) What are the main differences between black-box and white-box testing strategies? What are the approaches to black-box testing? What are the approaches to white-box testing? *[[CO3)(Understand/LOCQ)]*
- (c) What are the different kinds of system testing? What is performance testing? Name four different types of performance testing. *[[CO3)(Apply/IOCQ)]*
- (2 + 2) + (2 + 2) + (2 + 2) = 12**

Group - E

8. (a) How COCOMO II (or intermediate COCOMO) gives a better estimation of the project than COCOMO I? *[[CO5)(Understand/LOCQ)]*
- (b) For the given activity network, find the critical path and thus estimate the maximum time required to finish the project. Also draw the Gantt chart to complete the schedule.



[[CO6](Evaluate/HOCQ)]
 $(2 + 2) + (4 + 4) = 12$

9. (a) Write three limitations of LOC (Lines of Code) metric of project size estimation?
 [[CO4](Remember/LOCQ)]
- (b) Assume that the size of an organic type software product has been estimated to be 32 K lines of source code. Assume that the average salary of software engineers be Rs. 30,000/- per month. Determine the effort required to develop the software product, the nominal development time and cost required to develop the product. The constants for each category of software products are given below:

Project	a1	a2	b1	b2
Organic	2.4	1.05	2.5	0.38
Semidetached	3.0	1.12	2.5	0.35
Embedded	3.6	1.20	2.5	0.32

[[CO5](Evaluate/HOCQ)]

- (c) With examples compare and contrast between corrective and adaptive maintenance.
 [[CO4](Analyze/IOCQ)]

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

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	45.83	30.21	23.96

Course Outcome (CO):

After completion of the course, students will be able to:

- CO1: Propose a software life cycle model for the given requirements and compile software requirement specifications as per IEEE guidelines.
- CO2: Develop function-oriented design and/or object-oriented design for software systems using industry standard techniques.
- CO3: Apply the knowledge of different coding standards and/or guidelines and propose test cases for sample software system modules in different testing methods.
- CO4: Compare and contrast among different types of software maintenance and to decide on the maintenance models to be employed depending on the situation.
- CO5: Apply different project management strategies for project planning such as to estimate the project size, duration and cost.
- CO6: Apply the ideas of different project monitoring and control techniques such as WBS, Activity Network, PERT chart, Critical path etc. to efficiently monitor and control the project. They will be able to identify different software project risks and determine their mitigation approaches.

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