M.TECH/CSE/3RD SEM/CSEN 6101/2018

SOFTWARE ENGINEERING
(CSEN 6101)

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 one of the following is a suitable SDLC model for developing a moderate-sized software for which the customer is not clear about his exact requirements?
(a) RAD model (b) V-model
(c) Iterative waterfall model (d) Classical waterfall model.

(ii) Which one of the following charts is the most useful to decompose the project activities into smaller tasks that can be more meaningfully managed?
(a) PERT chart (b) GANTT chart
(c) Task network representation (d) Work breakdown structure.

(iii) Which of the following type of cohesion can be considered as the strongest cohesion
(a) Logical (b) Coincidental (c) Temporal (d) Functional.

(iv) A data flow diagram represents
(a) the conditions based on which a data may be processed
(b) the order in which different activities are carried out
(c) the transformation of data through processing stations
(d) the order in which various functions of a program are invoked.

(v) High coupling among modules makes it
(a) difficult to understand and maintain the product
(b) difficult to implement and debug
(c) expensive to develop the product as the modules having high coupling cannot be developed independently
(d) all of the above.

(vi) Which of the following is a black-box testing approach?
(a) Path testing (b) Boundary value testing
(c) Mutation testing (d) Branch testing.

(vii) The deviation of the observed behaviour to the specified is called
(a) Error (b) Fault (c) Failure (d) Defect.

(viii) Which one of the following is an example of a multivariable cost estimation model?
(a) Basic COCOMO (b) Intermediate COCOMO
(c) Complete COCOMO (d) Delphi technique.

(ix) As a software manager, when you will decide the number of people required for a software project?
(a) Before the scope is determined
(b) Before an estimate of the development effort is made
(c) After an estimate of the development effort is made
(d) none of the above.

(x) A decision table is a
(a) truth table
(b) a table which facilitates taking decisions
(c) a table listing conditions and actions to be taken based on the testing of conditions
(d) a table in a decision support system.

Group - B

2. (a) Why and/or when is it necessary to develop a prototype during software development? Explain in brief with suitable example(s).

(b) Draw a schematic for a typical spiral model for software development lifecycle. What does each of the four quadrants in this model signify? Explain in brief.

(c) Suppose you have been appointed as the analyst for a large software development project. Discuss the aspects of the software product you would document in the Software Requirement Specification (SRS) document. What would be the organization of your SRS document? How would you validate your SRS document?

(d) "It is easy for software engineers to develop software according to user requirements even if they are incomplete as software engineers can consider the user requirements of earlier developed software." Do you agree with this statement? Why or why not? Give reasons in support of your answer.

3 + 3 + 3 + 3 = 12

3. (a) What do you mean by requirement validation and why is it required?

   (b) Why is the SRS document also known as the black box specification of a system? Explain.

   (c) Suppose the analyst of a large product development effort has prepared the SRS document in the form of a narrative essay of the system to be developed. Based on this document, the product development gets underway. Explain the problems that such a requirements specification document may create during development.

   (d) What is the difference between structured analysis and object-oriented analysis?

(2 + 2) + 3 + 3 + 2 = 12

Group - C

4. (a) What do you understand by the terms "structured analysis" and"structured design"?

   (b) Draw a class diagram using the UML syntax to represent the fact that the book register of a library contains details of the all the books in the library. The details for each book includes its title, author, ISBN number, price, date of procurement, price, and date of last loan, person to whom loaned. A book can either be a reference or issue type book. The reference books are to be referred inside the library and cannot be loaned out, whereas issue books can be taken on loan by a member. The member register contains the details of all members of the library.

   (c) What problems are likely to arise if two modules have high coupling?

3 + 7 + 2 = 12

5. (a) Draw the context diagram and Level 1 DFD for the following Mail Order Processing System.
   HMV records is a mail-order company that distributes CDs and tapes at discount prices to record club members. When an order processing clerk receives an order form, he or she verifies that the sender is a club member by checking the member file. If the sender is not a member, the clerk returns the order along with a membership application form. If the customer is a member, the clerk verifies the order item data by checking the item file. Then the clerk enters the order data and saves it to the Daily Order file. The clerk also prints an invoice and shipping list for each order, which are forwarded to order fulfilment.

   (b) How are the concepts of cohesion and coupling useful in arriving at good software design?

9 + 3 = 12

Group - D

6. (a) Consider the following code:

```
void foo (float y, float a*, int n)
{
    float x = sin(y);
    if (x > 0.01)
        z = tan (x);
    else
        x = cos (x);
    for (int i = 0; i < x; ++i) {
        a[i] = a[i] * z;
        cout << a[i];
    }
    cout << 'function foo complete';
}
```

   Draw its flow graph, find its cyclomatic complexity and the independent paths.

   (b) Design a test suite for the above *foo* function using the following white-box testing strategies:
   (i) Statement coverage
   (ii) Branch coverage
   (iii) Condition coverage
   (iv) Path coverage.

(4 + 2 + 2) + 4 = 12

7. (a) "Branch coverage-based testing is stronger than statement coverage-based testing"- justify the statement with example.

   (b) Briefly highlight the difference between code inspection and code walkthrough.

   (c) Design black-box test suite for a program that accepts up to ten simultaneous linear equations in up to ten independent variables and displays the solution.

4 + 4 + 4 = 12

Group - E

8. (a) Explain when you use the PERT charts and when to use GANTT charts, if you were to perform the duties of a project manager?

   (b) Consider the size of an organic type software product that has been estimated as 32,000 lines of source code. The average salary of software developers is 15,000 p.m. Determine the effort required to develop the software, the nominal development time and the cost to develop the product.

   (c) For the following C program, estimate the Halstead's length and volume measures

```
int compute_gcd(int x, int y)
{
while (x != y)
if (x>y) then x=x-y;
else y=y-x;
return x;}
```

2 + 5 + 5 = 12

9. (a) As the manager of a software project to develop a product for business application, if you estimate the effort required for completion of the project to be 50 person-months, can you complete the project by employing 50 developers for a period of one month? Justify your answer.

   (b) Is it true that a software product can always be developed faster by having a larger development team (you can assume that all developers are equally proficient and have exactly similar experience)? Justify your answer.

   (c) What is the difference between a revision and a version? What do you understand by the terms change control and version control? Wny are these necessary? Explain how change and version control are achieved using a configuration management tool.

2 + 2 + (2 + 2 + 2 + 2) = 12