

```

int binary_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]<num)
            min = (min+max)/2;
        else return((min+max)/2);
    }
    return(-1);
}

```

- (d) Why Mixed integration testing is mostly preferred and commonly used for integration testing approach over top-down and bottom-up approaches?

2 + 2 + 5 + 3 = 12

Group - E

8. (a) Briefly explain with examples each of different categories of software development projects according to the Boehm [1981].
- (b) Assume that the size of an organic type software product has been estimated to be 32,000 lines of source code. Assume that the average salary of software engineers be ₹ 15,000/- per month. Determine the effort required to develop the software product, the nominal development time and cost required to develop the product.
- (c) What are the advantages of function points over the size metric of LOC?
9. Answer the following questions with respect to Project Planning:
- (a) You have been working as a Software Engineer (SE) for the last three years in a software services company named "Best Software". Now, you want to manage a new project as a Project Manager (PM) there. List any three skills / potentials that your management will like to consider you for the role of PM.
- (b) List any three essential activities you need to carry out as the PM for planning of a new project to develop a software application code-named "Y".
- (c) Explain the precedence ordering among these planning activities for "Y" using a suitable schematic diagram.
- (d) What is the full form of SPMP? Mention the typical points covered either under sections Project Resources, and Staff Organization, or under section Risk Management, in your SPMP for project "Y".

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

SOFTWARE ENGINEERING (CSEN 3202)

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) When user requirements are not complete and/or technical issues are not clear which model should be followed for software development?
 (a) Spiral model (b) Waterfall model
 (c) Prototyping model (d) RAD model.
- (ii) What is typically used to represent some complex processing logic in a tabular or matrix form during requirement analysis?
 (a) Decision Tree (b) Decision Table
 (c) Data Table (d) CRUD Matrix.
- (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) If all elements of a module perform similar operations, e.g. error handling, data input, data output, etc., the module is said to have _____ cohesion.
 (a) logical (b) temporal (c) procedural (d) sequential.
- (v) When the two bubbles are interconnected directly, it is referred to as
 (a) Serial DFD (b) Asynchronous DFD
 (c) Synchronous DFD (d) Balanced DFD.
- (vi) If data-items EMP-DOB, EMP-SEX and TOT-EARN from module CALC-EARN are passed on to module CALC-ITAX, then these two modules are said to have _____ coupling.
 (a) stamp (b) data (c) control (d) common.

- (vii) A sequence diagram provides the _____ view of a system.
 (a) implementation (b) structural
 (c) behavioral (d) environmental.
- (viii) System Testing performed by a friendly set of customers is called
 (a) Alpha Testing (b) Beta Testing
 (c) Performance Testing (d) Usability Testing.
- (ix) Equivalence class partitioning is followed in the
 (a) White box testing (b) Black box testing
 (c) Verification (d) none of these.
- (x) What is the slack time (in time units) for an activity that is on the critical path of a project schedule?
 (a) One (b) Zero (c) Maximum (d) Infinite.

Group - B

2. (a) For which type of software development, spiral model is suitable? — Explain
 (b) What are the activities carried out during the structured analysis phase?
 (c) What are the commonly made errors while constructing a DFD model?
 (d) What are the shortcomings of a DFD model?
3 + 3 + 3 + 3 = 12
3. Smart Stock Enterprises (SSE), one Pune-based start-up organization, specializing in customer services for stock-trading, has decided to engage Heritage Software Services (HSS), a promising software services company based at Kolkata, as the vendor for fresh development of IndiSmartTrader (IST), SSE's online stock trading application system. The development must start from 01-Oct-2017 and the developed IST has to go-live at SSE's Mumbai data centre from 01-Apr-2018 but its User Acceptance Test (UAT) at SSE's Pune corporate centre must commence from 01-Mar-2018.
 HSS has formed a team of system analysts and you are a part of it. This team, in its first team meeting, is debating on which SDLC model to use: (A) 'Iterative Waterfall', or (B) 'Rapid Prototyping'. A couple of team members are even suggesting adoption of some 'Agile' model. Are you in favor of or against using Agile model here?
 (a) Mention four points on the pros and cons of using 'Iterative Waterfall' model or 'Rapid Prototyping' model (but not for both).
 (b) Mention two points justifying your view about using or not using 'Agile' model.
6 + 6 = 12

Group - C

4. With respect to software design
 (i) state the most desirable combination of Cohesion and Coupling for good design.
 (ii) briefly explain any two types of Cohesion with example(s).

- (iii) briefly explain any two types of Coupling with example(s).
 (iv) rank the different types of Coupling, in order of most to least desirable.
(2 + 4 + 4 + 2) = 12
5. Answer the following questions in the context of OOAD Methodology:
 (a) List the different types of views and the corresponding diagrams that are used to describe a system in UML-based modeling.
 (b) Represent the following relationships amongst classes using UML diagrams:
 (i) Bill must contain one of more Items. Each Item describes one Commodity with its quantity, unit price, and total price.
 (ii) Students can opt for at least one and a maximum of up to five Courses. Each Course is taught by one or two Teachers.
8 + (2 × 2) = 12

Group - D

6. Answer the following questions with respect to software testing:
 (a) Explain, in brief, 'Equivalence Class Partitioning' and 'Boundary Value Analysis' approaches for black-box testing, with suitable example(s).
 (b) Explain, in brief, the concepts of 'Statement Coverage', 'Branch Coverage', 'Condition Coverage' and 'Path Coverage' strategies for white-box testing, with suitable example(s).
 (c) Identify the three equivalence classes for a module that computes the square root of an input integer that can assume values in the range of 1 to 400, both included.
 (d) Draw the Control Flow Graph (CFG) and work out the Cyclomatic Complexity (CC) for the following 'C' program segment:

```
int find_gcd(int a, int b) {
    while (a != b) {
        if (a > b)
            a = a - b;
        else
            b = b - a;
    }
    return a;
}
```

 (e) What is 'Regression Testing'? Explain its usefulness.
2 + 4 + 1½ + 2½ + (1 + 1) = 12
7. (a) What is the difference between verification and validation?
 (b) Briefly explain the role of 'Stub' and 'Driver' for Unit Testing of modules.
 (c) Design a White Box Test suite for the following code: (Draw the control flow graph and determine the basis set of linearly independent paths).