B.Tech Even Semester Examination, May, 2025

Computer Science & Engineering

(6th Semester)

Course No: CSE-604

(Software Engineering)

Full Marks: 70
Pass Marks: 28
Time: 3 hours

Note:

1. Attempt any five questions taking one from each unit.
2. Begin each answer in a new page
3. Answer parts of a question at a place
4. Assume reasonable data wherever required
5. The figure in the right margin indicates full marks for the question
6. All the mathematical symbols and abbreviations have their usual meanings.

1. (a) Briefly explain the definite stages through which a software product undergoes during its lifetime. What is the advantage of adhering to life cycle models for software development? 7

   (b) What is prototype? Under what circumstances is it beneficial to construct a prototype? What are the major advantages of first constructing a working prototype before developing the actual product? 7

2. (a) Define Agile Process and explain agility principle. Why is there a shift in current market to agile models from conventional models. 4+3

   (b) What is Extreme Programming? Why is it

called “Extreme”? Give an instance where XP can be most helpful. 2+2+2

(c) What is a sprint in SCRUM? 1

UNIT-II

3. (a) Who are the different categories of users of the SRS document? What are their expectations from the SRS document? 4

(b) What do you understand by traceability of requirements? Why is it important? 2+2

(c) Consider the following requirement for a software to be developed for controlling a chemical plant. The chemical plant has a number of emergency conditions. When any of the emergency conditions occurs, some prespecified actions should be taken. The different emergency conditions and the corresponding actions that need to be taken are as follows:

a) If the temperature of the chemical plant exceeds T1°C, then the water shower should be turned ON and the heater should be turned OFF. 6

b) If the temperature of the chemical tank falls below T2°C, then the heater should be turned ON and the water shower should be turned OFF.

c) If the pressure of the chemical plant is above P1, then the valve v1 should be OPENED.

d) If the chemical concentration of the tank rises above M, and the temperature of the tank is more than T3°C, then the water

10. (a) Discuss how the reliability changes over the life time of a software product and a hardware product. 4

(b) Schedule slippage is a very common form of risk that almost every project manager has to encounter. Explain in short how you would manage the risk of schedule slippage as the project manager of a medium-sized project. 4

(c) Suppose you are the project manager of a large software development project, point out the main steps you would follow to manage risks in your software project. 6

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(c) What do you understand by the term system testing? What are the different kinds of system testing that are usually performed on large software products? 2+4

UNIT-V

9. (a) The expected duration of each task has been calculated. The task dependencies are shown in the table below.

Task	Description	Order	Duration
A	Produce software specification	To be completed first	1 week
B	Write test plans	Start when A is complete	3 weeks
C	Software design	Start when A is complete	2 weeks
D	Software code	Start when B is complete	3 weeks
E	Developer test	Start when C is complete	3 weeks
F	Software test	Start when D and E are complete	4 weeks

i. Construct a PERT chart for the project.

ii. Identify the critical path and hence the minimum time to completion.

iii. Describe where there is slack time in the system. 3+3+1

(b) Among the different development phases of life cycle, testing typically requires the maximum effort. Identify the main reasons behind the large effort necessary for this phase. 3

(c) Explain when you should use PERT charts and when you should use Gantt charts while you are performing the duties of a project manager. 4

shower should be turned ON.

e) If the pressure rises above P3 and the temperature rises above T1°C, then the water shower should be turned ON, valves v1 and v2 are OPENED and the alarm bells sounded.

Write the requirements of this chemical plant software in the form of a decision table and tree.

4(. a) What are the main shortcomings of Data Flow Diagram (DFD) as a tool for performing structured analysis? 3

(b) What are the problems with requirement gathering and analysis. 2

(c) Draw a labelled DFD for the following Time Management Software. Clearly show the context diagram (Level 0 DFD) and its hierarchical decompositions up to Level 1. Also develop the structured design for the same.

Scenario: A company requires a time management system for its executives. The system should allow executives to register daily appointments, including participants, venue, time, duration, and purpose (e.g., project work). For meetings involving multiple executives, it should automatically find a common available slot, update all diaries accordingly, and notify the concerned executives via e-mail. If no common slot is found, the system should assist the secretary in rescheduling appointments after consulting the executives. An easyto-use graphical interface must be provided for

executives to view their daily schedules. The system should handle multiple remote requests from desktops, considering that many executives are novice users. Each morning, it should e-mail the day's appointments to every executive. Executives should also be able to mark leave periods and plan important tasks by hour in their daily schedules. Additionally, the system must generate statistics such as time spent in meetings per executive, project-wise meeting counts and durations, total man-hours spent, and the average fraction of time spent in meetings over a given period.) 2+3+4

UNIT-III

5. (a) What do you understand by the term functional independence in the context of software design? What is the advantage of functional independence? How can you achieve functional independence in a software design? 2+2+3

   (b) Compare relative advantages of the object-oriented and function-oriented approaches to software design. 3

   (c) Explain why a design approach based on the information hiding principle is likely to lead to a reusable and maintainable design. Illustrate your answer with a suitable example. 4

6. (a) Differentiate between structured analysis and structured design in the context of function oriented design. 3

   (b) How are cohesion and coupling concepts useful at designing a good system? Is it

true that whenever you increase the cohesion of different modules in your design coupling among these nodules automatically decreases? justify. 4

   (c) Define the term cohesion and its types. 7

UNIT-IV

7. (a) What is the difference between a coding standard and a coding guideline? Why are these considered important in a software development organization? Write down five important coding standards and coding guidelines that you would recommend for each. 2+2+5

   (b) Which one of the following is the strongest structural test technique: statement coveragebased testing, branch coverage-based testing, or condition coverage-based testing? Justify your answer with the help of a suitable example. 5

8. (a) When during the development process is the compliance with coding standards is checked? List two coding standards each for

   (i) enhancing readability of the code,

   (ii) reuse of the code. 5

   (b) Usually large software products are tested at three different testing levels, i.e., unit testing, integration testing, and system testing. Why not do a single thorough testing of the system after the system is developed, e.g. detect all the defects of the product during system testing? 3