Thapar Institute of Engineering and Technology, Patiala
Computer Science & Engineering Department

BE CoE Third Year
EST- DEC 07, 2024
Time: 3 Hours; MM: 40

Course Code: UCS503
Course Name: Software Engineering
Instructors: ASH, MHK, MNK, NT10, NT17

NOTE: Attempt FIVE Questions Only

Qno	Questions	Marks	CO	BL
Q1	a) Discuss Extreme Programming with a suitable diagram while elaborating on key phases and related activities.	4	CO5	L2 L3
	b) Create a User Story and User Card for Searching for a product on E-commerce site. Also, give the Front of the Card along with the Back of the Card giving Success and failure messages.	4		
Q2	**Consider the following Case** ShopGlobal allows customers to purchase products through various channels, including online, phone, or catalog orders. Each customer has a unique ID and is linked to exactly one account. Customers may register as web users to make online purchases, but registration is optional since purchases can also be made by phone or catalog. A web user has a unique login name, which serves as their ID, and can exist in different states: new, active, temporarily blocked, or banned. Web users can also be linked to a shopping cart, which belongs to their account. Each account owns a shopping cart and zero or more customer orders. Orders have unique IDs and current status (such as new, on hold, shipped, delivered, or closed), and they can be associated with several payments or none. Each payment has a unique ID and is linked to exactly one account. Orders and shopping carts have line items linked to exactly one product. A product may be associated with multiple line items or none at all. a) **Draw a Class Diagram demonstrating perspective Classes, their relationships, and cardinality among them.** b) **Identify and list any five significant objects. Also, draw the state chart diagram of the most significant object in this case.**	4.4	CO3	L3
Q3	**Consider the following Case and Identify four different types of testing you would perform for these features. Explain in detail and justify your answer based on different features you take into consideration for the type of testing** You are tasked with testing in a FinTech company that allows an online and secure payment option. In that application, users can arrange regular payments with the help of a newly added functionality. The following features are included in the feature: 1. Establishing automatic payments at weekly, monthly, or annual intervals. 2. Notifying users prior to the deduction of each payment. 3. Giving customers the option to change or stop their recurring payments at any moment	8	CO4	L4
Q4	a) Assume that the size of an organic type software product has been estimated to be 32000 lines of code. Assume that the average salary of software engineers	2, 6	CO2	L3

PTO

is Rs.15,000 per month. Determine the effort required to develop the software product and the nominal development time

b) **Consider the details regarding a project:**

Activity	Duration	Precedent	Activity	Duration	Precedent
A	6		E	3	B
B	4		F	10	
C	3	A	G	3	E, F
D	4	B	H	2	C, D

(i) **Create the Activity Network graph for this project. Show the calculation on Forward Pass and Backward Pass.**
(ii) **Calculate the Early Finish Time (EFT), Early Start Time (EST), Latest Start Time (LST) and Latest Finish Time (LFT) for all activities. Show in Table**

Activity	ES	EF	LS	LF	Slack

(iii) **Give the Critical Path, Critical time, and Critical Activities of that path.**

Q5	a) When designing database-specific systems, choosing the right architectural style depends on factors like scalability, performance requirements, data consistency needs, and complexity tolerance. Each style comes with trade-offs, and the design constraints ensure the system adheres to the desired principles while delivering the expected functionality. **Discuss any three architectural styles most suitable for implementing database-specific systems while discussing different factors and design constraints with suitable diagrams.**	6,2	CO3	L5

b) **Consider the following code and discuss in detail the type of coupling shown between TaskManager and Notification?**

```
class Notification {
public   void   sendNotification(String
message) {
    System.out.println("Notification
sent: " + message);  }}
```

```
class TaskManager {
    public void executeTask(Notification
notification, String taskName) {
        // Executes the task
        notification.sendNotification("Task
" + taskName + " completed.");  } }
```

Q6	a). How integration testing is different from unit testing. Give different approaches to integration testing where Stubs and Drivers could be used effectively. Explain with the help of suitable diagrams.	3, 5	CO4	L3

b) **Consider the code snippet and answer the following questions**

```
1.int module(int n) {
2.    int sum = 0;
3.   for (int i = 1; i <= n;
i++) {
4.     int j = i;
5.       while (j > 0) {
6.         sum += j;
7.          j--;
8.          if (sum > 10) {
9.             return
sum; } } }
10.    return sum; }
```

i) Create the context flow graph for the code.
ii) Calculate the cyclomatic complexity using three different methods.
iii) Identify the linearly independent paths and corresponding test cases.