Nirma University

Institute of Technology

Semester End Examination (IR) / Supplementary Examination, May - 2022

B. Tech. in Computer Science and Engineering, Semester-V

2CS504 Software Engineering

Roll / Exam No.		Supervisor's initial with date	

Time: 2 Hours | Max. Marks: 50

Instructions:
1. Attempt all questions.
2. Figures to right indicate full marks.
3. Draw neat sketches wherever necessary.
4. Attempt questions in sequence only.

Q-1. Do as directed: **[16]**

A CO1BL2 Draw a schematic diagram to represent the iterative waterfall model of software development. On your diagram, represent the deliverables produced at the end of each phase of the iterative waterfall model. [04]

B CO1BL4 Giving reasons for your answer based on the type of system being developed, suggest the most appropriate generic software process model that might be used as a basis for managing the development of the following systems: [06]

i. An extremely large software that would provide, monitor, and control cellular communication among its subscribers using a set of revolving satellites.
ii. A graphical user interface part of a large software product.
iii. A well-understood data processing application.

C CO2BL6 In the web-based online shopping system, customers can request to purchase one or more items from the supplier. The customer provides personal details, such as address and credit card information. This information is stored in a customer account. If the credit card is valid, then a delivery order is created and sent to the supplier. The supplier checks the available inventory, confirms the order, and enters a planned shipping date. When the order is shipped, the customer is notified and the customer's credit card account is charged. [06]

Use case scenarios are given to you now. There are two actors: Customer, who browses a catalog and requests to purchase items, and Supplier, who provides the catalog and services customer purchase requests. The customer initiates three use cases, which are Browse Catalog, to browse the catalog and select items; Make Order Request, to make a purchase request; and View Order. The supplier initiates two use cases, namely, Process Delivery Order, to service the customer's order, and Confirm Shipment and Bill Customer, to finalize the purchase.

In the Browse Catalog use case, the customer browses a World Wide Web catalog, views various catalog items from a given supplier's catalog, and selects items from the catalog. In the Make Purchase Request use case, the customer enters personal details. The system creates a customer account if one does not already exist. The customer's credit card is checked for validity and sufficient credit to pay for the requested catalog items. If the credit card check shows that the credit card is valid and has sufficient credit, then the customer purchase is approved and the system sends the purchase request to the supplier. In View Order, the customer requests to view the details of the delivery order.

The supplier-initiated use cases are Process Delivery Order and Confirm Shipment and Bill Customer. In the Process Delivery Order use case, the supplier requests a delivery order, determines that the inventory is available to fulfill the order, and displays the order.

In the Confirm Shipment and Bill Customer use case, the supplier prepares the shipment manually and confirms that the shipment is ready for shipment. The system then retrieves the customer's credit card details from the customer account and bills the customer's credit card.

The use cases are described in detail, except for the very simple View Order use case.

Draw Use Case Diagram for the mentioned problem definition.

Q-2.	**Do as directed:**	**[16]**
A CO2BL3	Differentiate between user and system requirements in requirement engineering. Mention user and system requirements for the bank management system.	[05]
B CO3BL5	The Switch is switched off once the temperature falls below 18 and then it is turned on when the temperature is more than 21. Identify the equivalence classes and find the boundary values for each of the identified classes.	[05]
C CO3BL1	Explain the role of the repository in software configuration management. Describe the features of software configuration management.	[06]
	OR	
C CO3BL1	Differentiate between cohesion and coupling. For a good quality software design, what should be the level of cohesion and coupling?	[06]

Q-3.	**Do as directed:**	**[18]**
A CO3BL6	Consider the following function:	[05]

```
sumcal(int maxint, int value)
{
    int result = 0, i = 0;
    if(value < 0)
        value = -value;
    while((i < value) && (result  <= maxint))
    {
```

```
        i = i + 1;
        result = result + 1;
    }
    if(result <= maxint)
        printf("%d", result);
    else
        printf("Large");
    printf("End of the program");
}
```

Perform the following tasks:

a) Design the control flow graph for the given code.
b) Determine cyclomatic complexity.
c) List the set of linearly independent paths.

B CO4BL4 Interpret the differences between process metrics and project metrics. Give three examples of each. [05]

C CO4BL6 A project consists of 8 activities named A to H. Consider the following table: [08]

Activity	Completion time (in days)	Immediate predecessor activities
A	3	-
B	6	A
C	7	A
D	5	A
E	13	B, C
F	8	C, D
G	11	D, F
H	6	G, E

i) Construct activity network so as to satisfy the scheduling requirements shown in the table.
ii) Find the least time required to complete the whole project.
iii) Show the calculation of free float time of each activity and based on that calculate the critical path.
iv) Identify the critical path.
v) How is the project completion time affected if:
   a. activity F is delayed by 3 days
   b. activity G is finished 7 days early

OR

C CO4BL6 Consider the following system: [08]
Company XYZ plants to enhance its Accounts Payable (AP) application. This is a menu driven system. To enter the application, the user must take selections from a main menu. The menu has following options:

- Invoices
  - Add an invoice
  - Display an invoice (by firing a query)
  - Update an invoice
  - Delete an invoice
- Payments
  - Retrieve payments due (by firing a query)
  - Payment records to be outputted to user.

Invoices and payments are maintained in the Invoice logical file in AP. This will allow users to maintain Vendor information in the AP application. The following is being added to the AP menu:

- Vendor
  - Add a vendor
  - Display vendor information (by firing a query)
  - Update vendor information

The vendor information will be maintained in a new Vendor logical file in the AP application. This AP application needs a file from another application called Customer Relations Management (CRM) application that gives information about all the customers present. Also, a report is generated at the end from AP application that stores information about invoice, payment and vendors.

All of these data are of average complexity and overall system is moderately complex i.e., assume sum of value adjustment factors is 50. Given the historical data that the organizational average productivity for systems of this type is 9.5 FP/pm. The cost of each function point is Rs 1230. Also, labor rate is of Rs 32,000 per month. Based on the data provided, compute the following:

a) Mention all the external inputs, external outputs, external inquiries, internal logical files and external interface files.
b) Compute FP for the system.
c) Measure the total estimated project cost of the system.

Weighting factors required are provided as follows:

Simple	Average	Complex
3	4	6
4	5	7
3	4	6
7	10	15
5	7	10

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