Jaypee Institute of Information Technology, Noida

T2 Examination, 2023

B.Tech VI Semester

Course Title: Software Engineering **Maximum Time: 1 Hr**

Course Code: 15B11CI513 **Maximum Marks: 20**

C314.1	Explain software engineering principles and software process models for project development.
C314.2	Identify functional and non-functional requirement of a software project and design document software requirement specification.
C314.3	Design, represent and document software requirement specification. Plan and execute activities for a software project.
C314.4	Apply UML modelling for software design from software requirement specification.
C314.5	Analyse code checklist. Perform Code Reviews, Code Refactoring, and Code Optimization, Design Pattern.
C314.6	Apply testing principles, develop and implement various manual and automated testing procedures, formal method.
C314.7	Evaluate software in terms of general software quality attributes and possible trade-off presented within the given problem.

Note: Attempt all the questions.

Q.1 [CO4] [5 Marks] An online movie ticket booking system facilitates the purchasing of movie tickets to its customers. E-ticketing system allow customers to browse through movies currently playing and book seats, anywhere and anytime. This ticket booking service should meet the following requirements: It should be able to list the cities where affiliate cinemas are located. Each cinema can have multiple halls and each hall can run one movie show at a time. Each movie will have multiple shows. Customers should be able to search movies by their title, language, genre, release date, and city name. Once the customer selects a movie, the service should display the cinemas running that movie and its available shows. The customer should be able to select a show at a particular cinema and book their tickets. The service show to customer the seating arrangement of the cinema hall. The customer should be able to select multiple seats according to their preference. The customer should be able to distinguish between available seats and booked ones. The system should send notifications whenever there is a new movie, as well as when a booking is made or cancelled. Customer of our system should be able to pay with credit cards or cash. The system should ensure that no two customers can reserve the same seat. Customers should be able to add a discount coupon to their payment.

Draw a detailed Use Case Diagram for this online movie ticket booking system.

Q.2 [CO4] [5 Marks] A homemaker wants to organize the birthday party at home. She needs to bake a cake for birthday party for her kid. For the cake, she checks the recipe and its ingredients availability, if items are unavailable then purchase those items. Once she collects all the ingredients, she decides to mix all dry and wet items separately as per the measurements. To prepare the cake, oven is preheated and all ingredients are mixed well.

Once the oven is heated with the required temperature, bake the cake for 15 minutes or it is not ready. Apart from the cake, she needs to prepare the snacks. Once the cake and snacks are ready, serve these items to kids.

Draw the activity diagram for the above case study. Mention initial state, final state, merge, join, fork, decision events in the activity diagram whenever applicable.

Q.3 [CO4] [2+3 Marks] A modern auto plant needs to be implemented. Each worker within the plan has one specific job, like mounting a cylinder head on an engine. The worker does one thing and does it the same way every time. The worker doesn't have any idea about the vehicle in which the engine will be installed. The engine, when completed, might be set in a 2-door closed roof vehicle or it may go in a small truck. The engine doesn't care which vehicle it's installed in and the vehicle doesn't care which engine is used. The connections between the engine and the vehicle are designed to as be generic a possible and engine specific connections points are minimized.

a) Identify if modules are tightly coupled or loosely coupled. Explain how cohesive each module is implemented. Justify your answer.
b) What problems are likely to arise if two modules have high coupling.

Q.4 [CO5] [2+3 Marks] Explain the prime objectives of Code Refactoring.

Also, perform a code refactoring technique on the below C function:

```
//C function starts
int* getSumOfPairs (int arr[], int length, int targetSum)
{
 int* result = (int*) malloc (2*sizeof(int));
  for (int i = 0; i < length; i++) {
      for (int j = i+1; j < length; j++) {
       if (arr[i] + arr[j] == targetSum) {
              result[0] = arr[i];
              result[1] = arr[j];
              return result;
          }
      }
  }
 return NULL;
}
//C function ends
```

Enrollment No: 20803665

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T1 Examination, 2023

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Note: Attempt all the questions.

Q.1 [CO1][4 Marks] "A company wants to develop a new music streaming platform like spotify. Spotify's engineering team faced challenges in the early stages of their development process, including difficulty in managing the complexity of their codebase and coordinating the work of their distributed team members"

Based on the above case study which model would you proposed to develop the above application and why? Explain in details.

Q.2 [CO1][6 Marks] Product manager has planned a list of activities culminating in the inaugurate launch of the new product. These are given in the table below:

Activity	P	M	O	Immediate Predecessor(s)
A	20	10	5	-
B	12	7	5	-
C	12	10	8	A
D	40	20	7	C
E	90	60	30	D
F	14	10	7	D
G	50	30	20	C
H	12	40	8	E,F,G
I	6	4	3	B
J	1	1	1	H,I

What is the probability that product manager will be able to complete the product launch within 80 day-time. Consider the z value(s) with their corresponding probability.

Z value	Probability
2.77	10%
5.83	18%
-2.77	0.3%

p.t.o

-5.83	0.5%

Q.3 [CO2][5+5 Marks] **Problem:** "A large scale farm is facing challenges in monitoring and optimizing crop growth and yield. The traditional methods of monitoring weather conditions and soil moisture are time consuming and labour-intensive. Moreover, the farm faces significant losses due to pest attacks and improper irrigation systems".

Approach: A smart agriculture system is proposed to address the farm's challenges. The system will collect the data from multiple sensors installed across the farm, including temperature, humidity, soil moisture and weather forecast data. The collected data will be analyzed to provide insights into the best irrigation and fertilization practies and to detect pest, diseases and weather changes.

The smart agriculture system will consist of a central control unit, sensors and actuators. The sensors will be installed in the field to collect the data on environmental factors while the actuators will control irrigations and fertilization system to optimize crop growth. The central control unit will store and process the data and provide real time alerts to farmers in case of any issue.

a) Based on the above case study describe the functional and non-functional requirements and outcome.

b) Write down the requirements elicitation techniques with explanation for the above case study.