Question Paper

Exam Date & Time: 30-Apr-2024 (02:30 PM - 05:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

DEPARTMENT OF I&CT, MIT, Manipal

BTech(Computer and Communication Engineering), IV semester

SOFTWARE DESIGN TECHNOLOGY [ICT 2228]

Marks: 50 **Duration: 180 mins.**

ANswer ALL the Questions. Missing data, if any, may be suitably assumed

1A) Imagine you are tasked with designing a chat tool, focusing on the following key features: (5)

a. One-on-one chat with low delivery latency

b. Small group chat capability (up to 100 people)

c. Online presence indication

d. Multiple device support allowing simultaneous logins

e. Push notifications

Your design should address scalability and interoperability requirements. Elaborate on the design guidelines / principles you would consider or adapt to create this chat application.

1B) A software test engineer is assigned the job of doing black box testing. He comes up with the following test cases given in Q1B, many of which are redundant. Identify the set of non-redundant test cases which can be selected using equivalence class partitioning approach from input perspective for black box testing? (3)

Test Case	Input Set			Expected Output Set			Discriminant
	a	b	c	Root1	Root2	Return Value	
T1	0	0	7	0	0	-1	N/A
T2	0	1	3	0	0	-1	N/A
T3	1	2	1	-1	-1	0	0
T4	4	-12	9	1.5	1.5	0	0
T5	1	-2	-3	3	-1	0	16
T6	1	1	4	0	0	-1	-15

Figure Q1B

1C) When Drivers and Stubs are used in software testing? Which types of software testing approach leads to creating more stubs? (2)

2A) Suppose a software company has developed an application that needs to be tested for the following issues: Datatype errors, Boundary value violations, Functional errors, Nonconformity with requirements, Architectural and component-level design errors. (5)

Outline a general testing strategy, highlighting the testing technique that is most appropriate for ensuring the product's quality.

2B) Create a state diagram that represents the operational states and transitions of an elevator system. The elevator system consists of multiple elevators that serve different floors in a building. The diagram should effectively illustrate the possible states and transitions that each elevator can go through, taking into account states like "Idle," "Moving," "Opening Doors," and "Closing Doors." The transitions should capture the logic of how elevators respond to calls from passengers, move between floors, and manage the opening and closing of doors. (3)

2C) A textile organization wants to develop an Inventory Control System for its internal use. The requirements are well understood and scope is well constrained. However the project is required to be delivered within short period of time (as soon as possible). Propose a life cycle model for this scenario and provide reason for justification of your answer. (2)

3A) Identify a suitable software architectural style suitable for design of database applications and Explain the architecture style in detail. (5)

3B) The PQR Institute has developed a system for assessing programming assignments submitted by students. The system receives the number of correct answers (out of 50) and the number of bonus points (out of 10). It calculates the total score and provides a grading as follows: (3)

- Greater than or equal to 40 - "Excellent"
- Greater than or equal to 30 and less than 40 - "Good"
- Less than 30 - "Needs Improvement"

In addition, if the total score is less than 0 or greater than 60, an error message ("Invalid Score") is displayed. Design test cases using equivalence class partitioning and boundary value analysis for this programming assessment system.

3C) Give two examples of information about a problem domain that can be captured in UML Activity Diagrams, and two ways in which these diagrams can be useful for Requirements Analysis (2)

4A) Design the test cases for the following code snippet using path testing. You are expected to follow the following steps to design an effective test case with a high probability of revealing defects. (5)

i) Draw the CFG (Control Flow Graph)

ii) Find the Cyclomatic Complexity using three methods.

iii) Identify the independent paths (Basic Path Set)

iv) Derive test cases

```
int average (int[ ] value, int min, int max, int N)

{

int i, totalValid, sum, mean;

i = totalValid = sum = 0;

while ( i < N && value[i] != -999 ) {

if (value[i] >= min && value[i] < = max){

totalValid += 1; sum += value[i];

}

i += 1;

}
```

```
if (totalValid > 0)

mean = sum / totalValid;

else

mean = -999;

return mean;

}
```

4B) Examine the steps involved in risk identification and their importance in the early stages of project planning. Illustrate how using a risk item checklist, questionnaire, risk components, and drivers can contribute to a comprehensive risk identification process. (3)

4C) What are reviews in the context of software engineering? List the types of software reviews. (2)

5A) Summarize the tasks in the inception, elaboration, negotiation, specification, and validation phases of requirements engineering. Emphasize the importance of each phase in creating a solid foundation for software development. (5)

5B) Evaluate the effectiveness of the Call and Return architectural Style in achieving modifiability and scalability. Analyze its strengths and weaknesses. (3)

5C) Translate the piece of java code given below into a sequence diagram. (2)

```
public class classA

private classB B = new ClassB();

public void m1(){

B. ma();

B.mb();

}
```

-----End-----