Question Paper

Exam Date & Time: 14-Jun-2024 (02:30 PM - 05:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

DEPARTMENT OF I&CT, MIT, MANIPAL
FOURTH SEMESTER B.TECH(CCE) MAKE-UP EXAMINATION EXAMINATIONS, JUNE 2024

SOFTWARE DESIGN TECHNOLOGY [ICT 2228]

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

Answer all the questions.

Instructions to Candidates: Answer ALL questions Missing data may be suitably assumed

1)
A) Assume you are assigned with the work of designing a video messenger tool, with an emphasis on the following features: (5)

   i. A one-on-one video with low delivery latency

   ii. Small group messaging (max of 100 people)

   iii. Online presence

   iv. Multiple device support. The same account can be logged in to multiple accounts at the same time.

   v. Push notifications

   The application should meet the scalability , interoperability requirements. Elaborate on the design principles you would be exploring / adapting to design the application.

B) Write the test cases for checking the stack conditions (full/empty) using functionality testing. (3)

C) For complex software systems, it is useful to write a description of the problem to be solved separately from any description of the proposed solution. Give three reasons why a separate problem description is useful. Why is it hard to write a problem description without also thinking about the proposed solution? (2)

2)
A) Design a sequence diagram to visually represent the interactions between the Event Organizer, Attendees, and the Event Management System (EMS) during the process of event registration and confirmation. In this context, emphasize the use of synchronous and asynchronous messages, found and lost messages, guard conditions, and interaction fragments to create a comprehensive representation of the sequence of events. The diagram should begin with the Attendee initiating the process by sending an asynchronous message to the EMS to inquire about event details. The EMS responds with a synchronous message, providing event information. Subsequently, the Attendee sends an asynchronous message to request registration, which may lead to a guard condition based on available slots or other criteria. If the guard condition evaluates positively, the EMS responds with a synchronous confirmation message, and the Attendee acknowledges this with another synchronous message. Simultaneously, the Event Organizer may monitor registration requests and, upon receiving an asynchronous notification, may send a found message to acknowledge receipt of the request and initiate further processing. If the registration request fails due to capacity constraints or other issues, a lost message should be indicated in the diagram. The EMS handles these requests and, based on the successful processing, responds asynchronously to the Organizer with either an approval message or a rejection message. (5)

B)	Consider an application developed by a company is tested for the following: incompatible data types, nonconformity with requirements, architectural and component-level design errors. Describe a generic testing strategy with an emphasis on testing technique required for testing the product under consideration.	(3)

C)	A education organization wants to develop an student and Faculty data management 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)

3) Identify a suitable software architectural style for design of Mobile application. Also, explain the identified architecture style in detail. (5)

A)

B) 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. (3)

   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

```
void main()
{
int a, b, c, max;
printf ("enter 3 integers");
scanf (" %d %d %d", &a, &b , &c);
if (a > b)
        if ( a > c)
                max = a;
        else
                max = c;
else if (b > c)
        max = b;
else
        max = c;
printf( "max = %d", max);

}
```

C) Compare and contrast reactive and proactive risk strategies. (2)

4) Draw a class diagram for the given scenario representing the multiplicity and different types of relationships between the classes. (5)

A) A college has one or more departments and ten or more rooms. Each department offers one or more courses, and a particular course will be offered by only one department. Each department has one or more Instructors, and each instructor only works for the associated department. These instructors can be Assistant Professor, Associate Professor, or Professor. Students can attend only one course, and every course may have 250 to 500 students. Instructors can teach one or more courses. Each course can also be taught by one or more instructors. The college rooms include office rooms, classrooms, faculty cabins, and laboratory rooms. Apart from this one room is allocated for the college canteen, where students/instructors can order one or more items by making the payment. This payment can be made in the form of UPI/ cash /credit card /debit card.

B) How does an organization handle changes before and after the software is released to a customer?. (3)

| C) | One of the fields on a MS-form consists of a textbox that accepts numeric value in the range of 18 to 25. Identify the equivalence classes and write the test cases. | (2) |

| 5) | | Which among the following architectural design styles has the goal of modifiability, goal of integrating the data: | (5) |
| | A) | i. Data flow style ii. data centered style iii. Call and return style. Explain your answer with suitable illustration. | |

| B) | What are the usual work products produced as a consequence of requirements elicitation? How does the collaborative requirements gathering translate the needs of the customer into technical requirements? Explain. | (3) |

| C) | Professor Z has proposed a conception of requirements engineering that distinguishes machine domain phenomena from application domain phenomena, as illustrated in the diagram Figure Q5C. Suggest two techniques that you would use for checking whether statements of the Requirements, R, and Domain Properties, D, are valid | (2) |

Figure Q5C.

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