## **Question Paper**

Exam Date & Time: 13-Jan-2024 (02:30 PM - 05:30 PM)



## MANIPAL ACADEMY OF HIGHER EDUCATION

V SEMESTER BTECH END SEM - MAKEUP EXAMINATION

SOFTWARE DESIGN TECHNOLOGY [ICT 3174]

Marks: 50

Duration: 180 mins.

## Descriptive

## Answer all the questions.

- 1A) How can the adoption of an iterative and incremental process model contribute to more efficient (5) software development in a dynamic project environment? Please provide specific examples of how this model addresses challenges like changing requirements and enhances collaboration among development teams. Explain any iterative and incremental process model in detail with a suitable diagram and phases. Write pros and cons of the same.
- 1B) What does Control Hierarchy entail in program design, and what are the influencing factors that (3) impact its structure.
- 1C) Provide a scenario where the Waterfall Model is well-suited and elaborate on its advantages. (2)
- 2A) Compare and contrast LOC with FP estimation techniques. Discuss the factors that can impact the (5) accuracy of Function Point estimation and strategies for mitigating potential challenges in the process. Consider the average as the degree of complexity with the following functional units and adjustment factor 15 to calculate the function point for the project.
  - Number of inputs = 40
  - Number of outputs = 28
  - Number of user enquiries = 32
  - Number of user files = 9
  - Number of external interfaces = 5
- 2B) Create a swimlane diagram to illustrate the process of a customer interacting with an ATM. The (3) sequence of events includes the customer inserting a card, the ATM validating the card, the customer entering a PIN upon successful validation, the bank authorizing the PIN, and the customer entering the desired amount. If the customer has a sufficient balance, the bank allows the debit, the ATM dispenses cash, and the customer retrieves the cash. If the validation fails or the amount is successfully debited, the ATM then displays the balance, ejects the card, and the customer retrieves it. Model each step in the process with clear transitions and actions
- 2C) Explain event system styles with a suitable real-time application scenario. (2)
- 3A) Draw a usecase diagram that models the following scenario. A student may register for classes (5) during a specified registration period. To register, a student must see their advisor. The advisor must approve each course that the student has selected. The advisor will use the registration system to determine if the student has met the course prerequisites, is in good academic standings and is eligible to register. If the advisor approves the courses, the advisor enters the student's college id into the course registration system. The course registration number for each course is

entered. The course description, course number and section for those courses will automatically display. The system will check for schedule conflicts before saving the registrations. A bill for the courses will print in the financial administrator's office. The student should proceed to pick it up. Faculty can use the registration system to check enrolments in their classes, get a class list, check a student's transcript, look up a student's phone number and other such student information. The registrar can use the registration system to enter new classes for an upcoming semester, cancel a class, and check conflicts in classroom/faculty assignments. Admissions use the registration system to add new students. Enrolment services use the registration system to report on retention, update student information, and check fulfilment of graduation requirements for those students planning to graduate.

3B) The UVW School is implementing a system to assess students' time management skills based on (3) their commitment to coursework. The system takes the number of study hours per week (out of 25) and the number of assignments submitted on time (out of 15). The overall time management level is determined as follows:

Greater than or equal to 30 - "Excellent Time Management"

Greater than or equal to 20 and less than 30 - "Good Time Management"

Less than 20 - "Needs Improvement"

If the total time management score is less than 0 or greater than 40, an error message ("Invalid Time Management Score") is displayed. Design test cases using equivalence class partitioning and boundary value analysis for this time management assessment system.

3C) Imagine a software development team tasked with creating a mobile application for a start-up (2) company. The application is expected to have a moderate level of complexity and will include features for user authentication, data synchronization, and real-time notifications. The initial size estimate for the project is 50,000 lines of code (KLOC), and the team plans to develop it in a semi-detached mode with a mix of experience levels.

a) Utilizing COCOMO II, compute the effort required for the project based on the provided size estimate and development mode.

b) Determine the expected duration and staffing needs, considering the effort estimation and the characteristics of the semi-detached development mode.

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

- 1. Draw the CFG (Control Flow Graph)
- 2. Find the Cyclomatic Complexity using three methods.
- 3. Identify the independent paths (Basic Path Set)
- 4. Derive test cases

```
int main() {
```

4A)

```
printf("Start of the programn");
```

int x = 0;

while (x < 5) {

printf("Value of x: %dn", x);

if (x % 2 == 0) {

printf("Evenn");

} else {

printf("Oddn");

} X++; switch (x) { case 1: printf("Onen"); break; case 2: printf("Twon"); break; default: printf("Othern"); } } printf("End of the programn"); return 0; } Summarize the tasks in the inception, elaboration, negotiation, specification, and validation phases (3) of requirements engineering. Emphasize the importance of each phase in creating a solid foundation for software development. What are PERT charts and advantages do they offer over activity charts? (2) Using the data in the provided figure calculate the overall project duration through an activity (5) precedence chart. Identify the critical path in this schedule. Create a table outlining the earliest start, earliest finish, latest start and latest finish times for each activity. Evaluate the impact on the project duration if Activity C encounters a 2-day delay.

4B)

4C)

5A)

Activity	Predecessor Activity	Optimistic estimate of time	Most likely estimate of time
А	-	12	14
В	-	16	17
С	А	14	15
D	А	13	18
Е	В	16	18
F	D,E	13	14
G	C,F	6	8

5B) Evaluate the effectiveness of reactive and proactive risk strategies in software project management. (3) Provide examples to illustrate scenarios where each strategy would be most suitable and discuss the implications of relying solely on reactive strategies.

5C) Evaluate the myths associated with software management, customer expectations, and developer (2) perceptions. Explain why the "Mongolian horde" concept is not applicable to software development, supporting your answer with relevant insights.

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