Question Paper

Exam Date & Time: 08-Dec-2023 (02:30 PM - 05:30 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

FIFTH SEMESTER B.TECH. DEGREE EXAMINATIONS - NOVEMBER / DECEMBER 2023 SUBJECT: ICT 3159- SOFTWARE ENGINEERING

Marks: 50

Answer all the questions.

1A)	 Giving reasons for your answer based on the type of system being developed, choose the most appropriate generic software process model that might be used as a basis for managing the development of the following systems: i) A system to control anti-lock braking in a car ii) A virtual reality system to support software maintenance iii) A university accounting system that replaces an existing system 	(5)		
1B)	Outline with a proper explanation when would you recommend against the use of an agile method (3) for developing a software system.			
1C)	Making use of architectural patterns suggest how do you achieve persistence with proper (2) descriptions of the same.			
2A)	Construct the control flow graph for the following C program to compute largest of three numbers (5) and then solve the Cyclomatic Complexity 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 $(b > c)$			
	$\max = \mathbf{b}$			
	else			
	max = c;			
	printf("max = %d", max);			
	}			

Duration: 180 mins.

2B) Imagine that the size of a semi-detached type software product has been estimated to be 16,000 (3) lines of source code. Compute the Effort estimate using the COCOMO model. Imagine for a software the count total is 56 and $\sum F_i = 46$ for a moderately complex 2C) (2)product. Calculate the Function Point. 3A) 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. 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 main() { printf("Start of the program\n"); for (int i = 1; $i \le 5$; i++) { printf("Iteration %d (for loop)\n", i); if (i % 2 == 0) { printf("Even iteration\n"); } else { printf("Odd iteration\n"); } } while $(j \le 3)$ printf("Iteration %d (while loop)\n", j); i++; if (i = 2) { printf("Second iteration in while loop\n");

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Analyse the significance of risk categorization in the context of software projects. Compare and contrast the approaches to risk categorization, emphasizing the impact each category can have on
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(3)

}

return 0;

printf("End of the program\n");

}

project planning, quality, and overall success.

- 3C) Analyse the features of software and compare the development process of software with that of hardware. How does the custom-built nature of most software impact its quality compared to component-based construction?
- 4A) Draw the use case diagram for the above problem statement and write the use case specification (5) for any two use cases of the use case diagram drawn: In a Restaurant, the client can order food, eat food, drink coffee (if he ordered it), and pay for the food and coffee (if it is ordered). The chef confirms the order and cooks the food. When the client orders food, the waiter confirms the order, serves food and facilitates payment to the client. The waiter also serves coffee if the client orders it. The cashier accepts payment from the client for the food he ordered and also for the coffee (if ordered). Payment can be made using a credit card, debit card, or UPI.
- 4B) "In a good software design, it is always desirable to have high coupling and low cohesion", Justify (3) this statement with an example.

4C) Consider a project with the following characteristics:

- i) Number of user inputs = 40, weight = 4
- ii) Number of user outputs = 28, weight = 5
- iii) Number of user inquiries = 32, weight = 4
- iv) Number of user files = 09, weight = 10
- v) Number of external interfaces = 05, weight = 7
- vi) Backup and recovery = 0.4
- vii) Data communication = 0.2
- viii) Distributed processing functions = 0.1
- ix) Complexity of processing = 0.4.
- Assuming the remaining complexity adjustment factor as 0, calculate the function points for the project.

5A)

Consider the activities given below:

Activity	Predecessors	Duration (days)
a	_	3
b	a	4
c	a	5
d	a	4
e	b	2
f	d	9
g	c, e	6
h	f,g	2

i) Draw the network diagram and identify the critical activities using the Critical Path Method.

ii) How much time is required to complete the project?

iii) What will be the project completion time in the following three scenarios:

a) If the activity f gets delayed by two days due to unforeseen circumstances?

b) If activity c gets delayed by two days due to unforeseen circumstances?

c) If the activity e gets delayed by two days due to unforeseen circumstances?

Construct an activity diagram with swimlane for the scenario, which describes the process of publishing an academic paper. The review process starts when the author submits a paper to an editor of a journal. The editor first checks whether the paper fits the theme of the journal. If not, the editor rejects the paper. Otherwise, the editor assigns the paper to three independent reviewers. The reviewers read the paper and sent the comments to the editor. The editor then assesses the quality of the paper with the help of reviewers' comments. If the comments of at least two reviewers favor publication, then the document is accepted for publication, and the author is notified. Furthermore, the paper is forwarded to the publisher for publication. If the quality is bad, the editor

(3)

(2)

(5)

rejects the paper.

5C) Assume that the size of an organic-type software product has been estimated to be 22,000 lines of (2) source code. Assume that the average salary of software engineers is Rs. 15,000/- per month. Determine the effort required to develop the software product and the nominal development time.

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