

Hall Ticket Number :									
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<b>R-19</b>
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**Code: 19A541T**

II B.Tech. II Semester Regular Examinations August 2021

**Artificial Intelligence**

( Computer Science and Engineering )

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit ( 5x14 = 70 Marks )

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	Marks	CO	Blooms Level
<b>UNIT-I</b>			
1. List and explain the applications of AI.	14M	CO-1	BL-2
<b>OR</b>			
2. a) Draw a state space representation of Towers of Hanoi problem	7M	CO-1	BL-4
b) Discuss the history of AI.	7M	CO-1	BL-2
<b>UNIT-II</b>			
3. Describe the following in detail: - a) Iterative Deepening b) Depth first search c) Differentiate informed and uninformed search	14M	CO-2	BL-4
<b>OR</b>			
4. a) Discuss Simulated Annealing in detail.	7M	CO-2	BL-2
b) Illustrate cryptarithmic problem with an example to relate it to CSP.	7M	CO-2	BL-3
<b>UNIT-III</b>			
5. List various components of natural language understanding process. Describe syntax analysis and semantic analysis in brief.	14M	CO-2	BL-4
<b>OR</b>			
6. a) Consider the facts: i. The members of the Elm St. Bridge Club are Joe, Sally, Bill, and Ellen. ii. Joe is married to Sally. iii. Bill is Ellen's brother. iv. The spouse of every married person in the club is also in the club. v. The last meeting of the club was at Joe's house. Convert to predicate logic and prove that "Ellen is not married".	7M	CO-2	BL-3
b) Differentiate between forward chaining and backward chaining.	7M	CO-2	BL-2
<b>UNIT-IV</b>			
7. a) Give comparison between hierarchical planning and conditional planning.	7M	CO-3	BL-2
b) Discuss categories and objects	7M	CO-4	BL-2
<b>OR</b>			
8. a) Discuss mental Events and Objects	7M	CO-4	BL-2
b) Discuss partial order planning.	7M	CO-3	BL-2
<b>UNIT-V</b>			
9. Write short notes on: a) Fuzzy Logic b) Acting under uncertainty c) Baye's Rule and it's use	14M	CO-5	BL-2
<b>OR</b>			
10. Define uncertain knowledge, prior probability and conditional probability. How it is useful for decision making under uncertainty about knowledge? Explain the method of performing exact inference in Bayesian networks briefly.	14M	CO-5	BL-2

\*\*\*END\*\*\*

**Code: 19A542T**

II B.Tech. II Semester Regular Examinations August 2021

**Design and Analysis of Algorithms**  
( Computer Science and Engineering )

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit ( 5x14 = 70 Marks )

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Marks	CO	Blooms Level
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**UNIT-I**

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|---|----|-----|----|
| 1. a) Why do we use asymptotic notations in the study of algorithms? Briefly describe the commonly used asymptotic notations. | 7M | CO1 | L4 |
| b) Give a simple way to implement Disjoint-set data structure.  | 7M | CO1 | L2 |

**OR**

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|--|----|-----|----|
| 2. a) Using substitution method to solve the following recurrence relation to give an upper bound and lower bound. $T(n)=2T(n/2)+ (n)$ | 9M | CO1 | L4 |
| b) Explain the properties of an algorithm with an example.   | 5M | CO1 | L2 |

**UNIT-II**

- |   |    |     |    |
|---|----|-----|----|
| 3. a) Show that Quick Sort algorithm takes $O(n^2)$ time in the worst case. | 9M | CO2 | L4 |
| b) Show that the total running time of merge-sort is $O (n \log n)$ .       | 5M | CO2 | L4 |

**OR**

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|--|-----|-----|----|
| 4. State the Job – Sequencing with deadlines problem. Find an optimal sequence to the $n=5$ Jobs where profits $(P1, P2, P3, P4, P5) = (20, 15, 10, 5, 1)$ and deadlines $(d1, d2, d3, d4, d5) = ( 2, 2, 1, 3, 3)$ . | 14M | CO2 | L4 |
|--|-----|-----|----|

**UNIT-III**

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|--|-----|-----|----|
| 5. Deduce a recursive definition for finding the minimum cost of Matrix-Chain multiplication problem. Find an optimal parenthesis of a matrix chain product whose sequence of dimension is: $\langle 5*10, 10*3, 3*12, 12*5, 5*50, 50*6 \rangle$ | 14M | CO3 | L4 |
|--|-----|-----|----|

**OR**

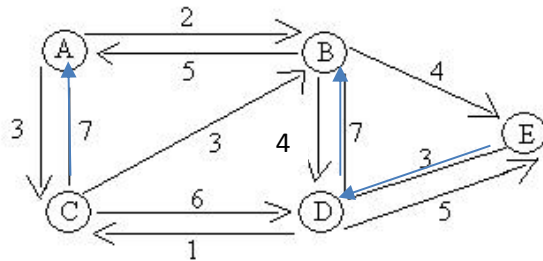
- |   |     |     |    |
|---|-----|-----|----|
| 6. Construct an optimal binary search tree for the identifiers $a_1, a_2, a_3, a_4$ with the probabilities $\{p_1, p_2, p_3, p_4\}=\{3/20, 4/20, 1/20, 4/20\}$ and $\{q_0, q_1, q_2, q_3, q_4\} = \{1/20, 2/20, 2/20, 1/20, 2/20\}$ . | 14M | CO3 | L4 |
|---|-----|-----|----|

**UNIT-IV**

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|--|-----|-----|----|
| 7. What is backtracking? Find a solution to the 4-Queens problem using backtracking strategy. Draw the solution space using necessary bounding function. | 14M | CO4 | L2 |
|--|-----|-----|----|

**OR**

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|---|--|--|--|
| 8. Solve the traveling sales man problem for the following graph by using branch and bound. |  |  |  |
|---|--|--|--|



	14M	CO4	L3
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**UNIT-V**

- |   |     |     |    |
|---|-----|-----|----|
| 9. Define NP-complete decision problem. Consider the example of Hamiltonian circuit and explain how closely related decision problems are polynomially reducible. | 14M | CO5 | L1 |
|---|-----|-----|----|

**OR**

- |   |    |     |    |
|---|----|-----|----|
| 10. a) Define NP complete and NP hard problems with example.  | 8M | CO5 | L1 |
| b) Give an example to explain the non-deterministic algorithm | 6M | CO5 | L2 |

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Code: 19A543T

II B.Tech. II Semester Regular Examinations August 2021

**Formal Languages and Automata Theory**

( Computer Science and Engineering )

Max. Marks: 70

Time: 3 Hours

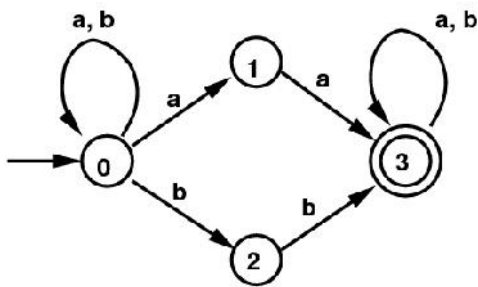
Answer any five full questions by choosing one question from each unit ( 5x14 = 70 Marks )

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Marks CO Blooms Level

**UNIT-I**

1. Let M be the NFA shown in Figure.

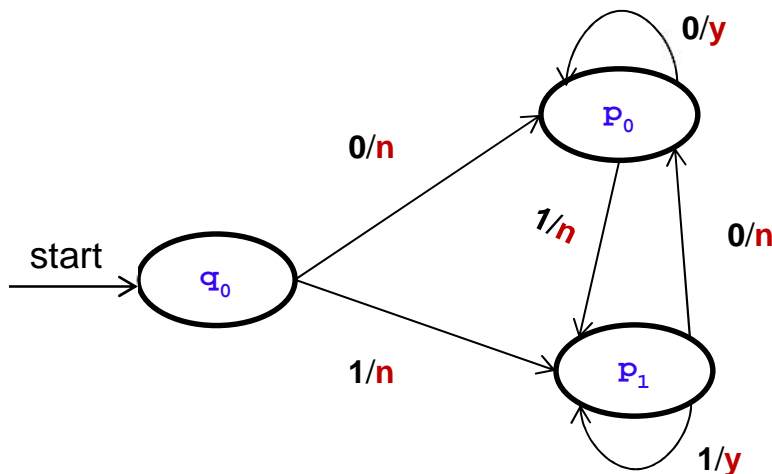


Construct Equivalent DFA for the above NFA

14M CO1 L1,L2

OR

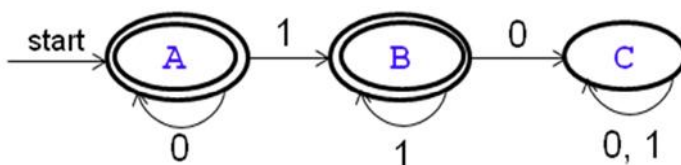
2. Construct the Moore machine for given Mealy machine.



14M CO1 L1,L2

**UNIT-II**

3. Construct Regular Expression for the given DFA



14M CO2 L2,L3

OR

4. a) Show that the language  $L = \{0^n 1^n \mid n > 1\}$  is not regular using pumping lemma  
 b) Write about the applications of Regular expressions.

8M CO2 L2,L3

6M CO2 L2,L3

<b>UNIT-III</b>
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5. a) Construct the leftmost and rightmost derivation and parse tree for the following grammar

$$S \rightarrow aB / bA, A \rightarrow aS / bAA / a, B \rightarrow bS / aBB / b$$

which accepts the string aaabbabbba.

8M CO3 L4

- b) Enumerate the properties of CFL. Explain any two of them.

6M CO3 L4

**OR**

6. Convert the following grammar in to GNF:

$$S \rightarrow ABA / AB / BA / AA / B$$

$$A \rightarrow aA / a$$

$$B \rightarrow bB / B$$

14M CO3 L4

<b>UNIT-IV</b>
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7. Obtain a PDA to accept the language  $\{L = 0^n 1^n / n \geq 1\}$ .

14M CO4 L3

**OR**

8. Convert the following CFG to PDA:

$$S \rightarrow B \mid aAA$$

$$A \rightarrow aBB \mid a$$

$$B \rightarrow bBB \mid A$$

$$C \rightarrow a$$

14M CO4 L3

<b>UNIT-V</b>
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9. Design a Turing Machine (TM) to accept the language consisting of all palindromes of 0's and 1's.

14M CO5 L3

**OR**

10. a) Explain about post correspondence problem.

7M CO5 L3

- b) Explain the Universal Turing machine in detail.

7M CO5 L3

\*\*\*END\*\*\*

Hall Ticket Number :

**R-19**

**Code: 19A544T**

II B.Tech. II Semester Regular Examinations August 2021

**Object Oriented Programming using JAVA**

( Computer Science and Engineering )

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit ( 5x14 = 70 Marks )

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	Marks	CO	Blooms Level
<b>UNIT-I</b>			
1. a) Explain the benefits and applications of OOPs	7M	CO1	L2
b) Define Constructor. Explain parameterized constructor.	7M	CO1	L2
<b>OR</b>			
2. a) Describe the features of Java.	7M	CO1	L2
b) Define multidimensional array? Write a java program for matrix multiplication.	7M	CO1	L1
<b>UNIT-II</b>			
3. a) Discuss different forms of Inheritance with an example	7M	CO2	L2
b) Illustrate the use of "this" keyword with an example.	7M	CO2	L3
<b>OR</b>			
4. a) Explain access specifiers in java in detail.	7M	CO2	L2
b) Differentiate between method overloading and method overriding with an example.	7M	CO2	L2
<b>UNIT-III</b>			
5. a) Explain Thread life cycle.	7M	CO3	L2
b) Define an Exception. Explain the exception hierarchy and how to throw, catch and handle an exception with an example.	7M	CO3	L2
<b>OR</b>			
6. a) Explain Thread priorities and synchronization with example.	7M	CO3	L2
b) Illustrate user defined exceptions with an example.	7M	CO3	L3
<b>UNIT-IV</b>			
7. a) What are Generics? Explain about bounded types in generics with an example program.	7M	CO4	L1
b) Explain overriding methods in a Generic class.	7M	CO4	L2
<b>OR</b>			
8. a) Write a generic method to exchange of two different elements in an array.	7M	CO4	L3
b) Define Lambda expression. Explain about Block Lambda expressions.	7M	CO4	L1
<b>UNIT-V</b>			
9. a) Discuss about Scanner class in java with example program	7M	CO5	L2
b) Explain the differences between Vector and Arrays. Explain the methods in Vector class.	7M	CO5	L2
<b>OR</b>			
10. a) Explain various interfaces used in Collection framework?	7M	CO5	L2
b) What is the difference between the length of an array and size of ArrayList? Explain with an example.	7M	CO5	L2

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<b>R-19</b>
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**Code: 19A545T**

II B.Tech. II Semester Regular Examinations August 2021

**Operating Systems**

( Computer Science and Engineering )

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit ( 5x14 = 70 Marks )

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		Marks	CO	Blooms Level
<b>UNIT-I</b>				
1.	a) Explain different operations performed by the operating system.	7M	CO1	L2
	b) State and explain various types of computer systems.	7M	CO1	L2
<b>OR</b>				
2.	a) Explain different process states with neat sketch	7M	CO1	L2
	b) Explain the Round Robin scheduling algorithm with a suitable example.	7M	CO1	L2
<b>UNIT-II</b>				
3.	Explain the reader writer's problem and its solution using the concept of semaphores.	14M	CO2	L4
<b>OR</b>				
4.	a) Explain the usage and structure of monitors with an example.	7M	CO2	L2
	b) Differentiate between			
	i) Process and a Thread      ii) User Level and Kernel level thread	7M	CO2	L3
<b>UNIT-III</b>				
5.	a) Explain Banker's deadlock-avoidance algorithm with an illustration	7M	CO3	L2
	b) What is paging? Explain its structure for 32 -byte memory with 4-byte pages.	7M	CO3	L3
<b>OR</b>				
6.	a) Explain about demand paging.	7M	CO3	L2
	b) Consider the reference string: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1 for a memory with three frames. Trace FIFO, optimal, and LRU page replacement algorithms.	7M	CO3	L5
<b>UNIT-IV</b>				
7.	a) List out the various methods for free-space management and explain them.	7M	CO4	L1
	b) Discuss in detail about different file access methods.	7M	CO4	L2
<b>OR</b>				
8.	a) Briefly explain about single-level, two-level and Tree-Structured directories	7M	CO4	L3
	b) Describe file system mounting.	7M	CO4	L1
<b>UNIT-V</b>				
9.	a) Explain about domains of protection.	7M	CO5	L2
	b) How can you transfer I/O requests to hardware operations?	7M	CO5	L1
<b>OR</b>				
10.	a) Explain about the layers of I/O system.	7M	CO5	L2
	b) Discuss about the principles of protection.	7M	CO5	L2

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<b>R-19</b>
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**Code: 19AC43T**

II B.Tech. II Semester Regular Examinations August 2021

**Probability and Statistics**

( Computer Science and Engineering )

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit ( 5x14 = 70 Marks )

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		Marks	CO	Blooms Level
<b>UNIT-I</b>				
1.	a) Define median and mode. Discuss their relative merits and demerits.	7M	CO1	L2
	b) Find the mean, median and mode for the following: Mid Value: 15    20    25    30    35    40    45    50    55 Frequency: 2    22    19    14    3    4    6    1    1	7M	CO1	L2
<b>OR</b>				
2.	a) Find the coefficient of correlation between industrial production and export using the following data and comment on the result. Production (in crores tons): 55    56    58    59    60    60    62 Exports (in crores tons) : 35    38    38    39    44    43    45	7M	CO1	L2
	b) Find the rank correlation for the following data: X: 56    42    72    36    63    47    55    49    38    42    68    60 Y: 147    125    160    118    149    128    150    145    115    140    152    155	7M	CO1	L2
<b>UNIT-II</b>				
3.	a) A can hit a target 3 times in 5 shots, B 2 times in 5 shots and C 3 times in 4 shots. They fire a volley. What is the probability that (i) two shots hit, (ii) atleast two shots hit?	7M	CO2	L2
	b) In a bolt factory, machines A, B and C manufactures 25%, 35% and 40% of the total. Of their output 5%, 4% and 2% are defective bolts. A bolt is drawn at random from the product and is found to be defective. What are the probabilities that it was manufactured by machines A, B or C?	7M	CO2	L3
<b>OR</b>				
4.	a) A random variable X has the following probability distribution. X:    0    1    2    3    4    5    6    7 p(x): 0    k    2k    2k    3k    k <sup>2</sup> 2k <sup>2</sup> 7k <sup>2</sup> +k (i) Find the value of k    (ii) Evaluate P(X<6)    (iii) Evaluate P(X = 6) (iv) Evaluate P(0<X<5)	7M	CO2	L2
	b) Calculate the mean and standard deviation of the probability density function $f(x) = \begin{cases} \frac{1}{4}e^{-x/4} & \text{for } x > 0 \\ 0 & \text{elsewhere} \end{cases}$	7M	CO2	L2
<b>UNIT-III</b>				
5.	a) In a bombing action there is 50% chance that any bomb will strike the target. Two direct hits are needed to destroy the target completely. How many bombs are required to be dropped to give a 99% chance or better of completely destroying the target?	7M	CO3	L3

- b) If the probability of a bad reaction from a certain injection is 0.001, determine the chance that out of 2000 individuals more than two will get a bad reaction. 7M CO3 L3

OR

6. a) X is a normal variate with mean 30 and standard deviation 5. Find the probabilities that i)  $26 \leq X \leq 40$  ii)  $X \geq 45$  iii)  $X - 30 > 5$ . 7M CO3 L3
- b) In a Normal Distribution 7% items are under 35 and 89% are under 63. What are the mean and standard deviation of the distribution? 7M CO3 L3

## UNIT-IV

7. a) A random sample of size 100 has a standard deviation of 5. What can you say about the maximum error with 95% confidence? 7M CO4 L4
- b) In a random sample of 250 workers exposed to a certain amount of radiation 42 experienced ill-effects, Construct 95% confidence interval for the corresponding true proportion. 7M CO4 L4

OR

8. a) A random sample of 100 recorded deaths in a country showed an average life span of 71.8 years. Assuming a population standard deviation of 8.9 years, does this seem to indicate that the mean life span today is greater than 70 years? Use a 0.05 level of significance. 7M CO4 L4
- b) A market researcher engaged by a particular company's products in city A exceeds this proportion in city B by 0.05. The researcher conducts survey of two cities and finds the following results:

City	Sample size	No. of households using company's products
A	$n_1 = 160$	120
B	$n_2 = 150$	100

- Use 0.05 level of significance and test the researcher's claim. 7M CO4 L4

## UNIT-V

9. a) The nine items of a sample have the following values: 45, 47, 50, 52, 48, 47, 49, 53 and 51. Does the mean of these differ significantly from the assumed mean 47.5? 7M CO5 L4
- b) In a test given two groups of students, the marks obtained are as follows:  
 First Group : 18 20 36 50 49 36 34 49 41  
 Second Group: 29 28 26 35 30 44 46 - -  
 Estimate the significance of the difference between the mean marks secured by the students of the above two groups. 7M CO5 L4

OR

10. a) Random samples from two normal populations are given below.

Sample1	16	26	27	23	24	22
Sample2	33	42	35	32	28	31

- Do the population variances differ significantly? 7M CO5 L4

- b) A test of five similar coins is tossed 320 times and hence the result is

No. of heads:	0	1	2	3	4	5
Frequency :	6	27	72	112	71	32

- Test the hypothesis that the data follow a binomial distribution. 7M CO5 L4

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Hall Ticket Number :

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**R-19**

**Code: 19A546T**

II B.Tech. II Semester Regular Examinations August 2021

**Software Engineering**

( Computer Science and Engineering )

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit ( 5x14 = 70 Marks )

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Marks CO Blooms Level

**UNIT-I**

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|--|----|-----|----|
| 1. a) List and describe the characteristics of a good software | 7M | CO1 | L1 |
| b) What are different software myths? Explain                  | 7M | CO1 | L1 |

**OR**

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|---|----|-----|----|
| 2. a) Briefly discuss about Prescriptive process models                     | 7M | CO1 | L1 |
| b) What is unified process? Discuss different phases in the unified process | 7M | CO1 | L2 |

**UNIT-II**

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|--|-----|-----|----|
| 3. What is Requirements Engineering? Explain different tasks involved in Requirement Engineering Process | 14M | CO2 | L2 |
|--|-----|-----|----|

**OR**

- |   |    |     |    |
|---|----|-----|----|
| 4. a) What are the requirements elicitation techniques? Why is requirement elicitation necessary? | 7M | CO2 | L2 |
| b) Demonstrate Scenario-Based Modeling  | 7M | CO2 | L3 |

**UNIT-III**

- |   |    |     |    |
|---|----|-----|----|
| 5. a) Describe the flow of information during software design using a diagram       | 7M | CO3 | L3 |
| b) Explain the different categories of architecture styles along with the examples. | 7M | CO3 | L2 |

**OR**

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|--|----|-----|----|
| 6. a) Illustrate Basic Design Principles and guidelines for Component-level Design | 7M | CO3 | L3 |
| b) What is Coupling and how it is differ from Cohesion?                            | 7M | CO3 | L2 |

**UNIT-IV**

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|---|-----|-----|----|
| 7. State and explain Golden Rules of UI? How these rules affect on UI analysis and design | 14M | CO4 | L2 |
|---|-----|-----|----|

**OR**

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|---|-----|-----|----|
| 8. What are the various testing strategies to software testing? Discuss them. | 14M | CO4 | L2 |
|---|-----|-----|----|

**UNIT-V**

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|--|----|-----|----|
| 9. a) Outline project planning in software project management? | 7M | CO5 | L4 |
| b) What is Capability Maturity Model explain different levels? | 7M | CO5 | L2 |

**OR**

- |  |    |     |    |
|--|----|-----|----|
| 10. a) Illustrate software quality and software reliability                | 7M | CO5 | L4 |
| b) How software reverse engineering is helpful in development of software? | 7M | CO5 | L2 |

\*\*\*END\*\*\*