

**END SEMESTER EXAMINATION : MARCH 2023**  
**SEMESTER 4 : INTEGRATED M.Sc. PROGRAMME COMPUTER SCIENCE**  
**COURSE : 21UP4CRMCP13 : BASICS OF ARTIFICIAL INTELLIGENCE**  
*(For Regular - 2021 Admission)*

Time : Three Hours

Max. Weightage: 30

**PART A****Answer Any 8 Questions**

1. Find the derivative of  $\tan\left(\frac{1}{x}\right)$ .
2. Define a generating function.
3. Define the term goal node in AI.
4. Define the generating function for the Fibonacci sequence.
5. Find the probability that when two dice are rolled, the sum of the numbers on the two dice is 7.
6. Define the term gradient of a function.
7. Find the probability of getting a total of 7 or 11 when a pair of fair dice are tossed.
8. Define the term proposition in propositional logic.
9. Write the negation of the statement "All Americans eat cheeseburgers" using quantifiers.
10. Write the recurrence relation of the sequence: 1, 3, 6, 10, 15, 21, .....

**(1 x 8 = 8 Weight)****PART B****Answer Any 6 Questions**

11. Discuss briefly about scaling of generating functions.
12. Find  $\frac{dy}{dx}$  if  $x - y = \pi$
13. An urn contains 4 tickets numbered 1, 2, 3, 4 and another contains 6 tickets numbered 2, 4, 6, 7, 8, 9.  
If one of the two urns is chosen at random and a ticket is drawn at random from the chosen urn, find the probabilities that the ticket drawn bears the number (a) 2 or 4, (b) 1 or 9.
14. Prove that  $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$
15. Differentiate between ignorable and recoverable problems in AI with an example for each.
16. Discuss the travelling salesman problem in AI with an example.
17. Ten coins are thrown simultaneously. Find the probability of getting at least seven heads.
18. List and explain the various kinds of knowledge that can be represented.

**(2 x 6 = 12 Weight)****PART C****Answer Any 2 Questions**

19. Solve the recurrence relation  $3a_{n+1} - 4a_n = 0, n \geq 0, a_1 = 5$
20. Prepare a detailed note on Production systems in AI.

21. Find the partial derivative of the following functions:

(a).  $f(x, y, z) = 4x^3y^2 - e^zy^4 + \frac{z^3}{x^2} + 4y - x^{16}$

(b).  $f(x, y, z) = \cos(x^2 + 2y) - e^{4x-z^4y} + y^3$

22. Calculate the coefficient of correlation from the following data:

<b>X:</b>	1	2	3	4	5	6	7	8	9
<b>Y:</b>	9	8	10	12	11	13	14	16	15

Also, obtain an estimate of Y which should correspond on the average to X = 6.2.

**(5 x 2 = 10 Weight)**