

END SEMESTER EXAMINATION - MARCH 2026**SEMESTER 4 : INTEGRATED M.Sc. PROGRAMME COMPUTER SCIENCE- DATA SCIENCE****COURSE : 21UP4CRMCP13 : BASICS OF ARTIFICIAL INTELLIGENCE***(For Regular 2024 Admission and Improvement/Supplementary 2023/2022/2021 Admissions)*

Time : Three Hours

Max. Weightage: 30

PART A**Answer any 8 Questions**

1. Find the generating function of the sequence: 1,2,3,4,.....
2. A card is drawn from a well-shuffled pack of playing cards. Find the probability that it is either a spade or an ace.
3. Define inhomogeneous recurrence relation.
4. Define the term goal node in AI.
5. The value of the generating function $1 - x + x^2 - x^3 + x^4 - \dots =$
6. Define the term gradient of a function.
7. Define universal quantification in predicate logic.
8. State the rule of inference used in the argument "If it snows today, the university will close. The university is not closed today. Therefore, it did not snow today"
9. State the derivative of logistic function.
10. Find the probability that when two dice are rolled, the sum of the numbers on the two dice is 7.

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

11. List the steps involved in solving homogeneous recurrence relations using characteristic roots.
12. Perform a critical comparison of breadth-first and depth-first search algorithms.
13. Find the derivative of $\sin x + \cos x$ from first principle.
14. "All students in this class understand logic. Xavier is a student in this class. Therefore, Xavier understands logic."
Determine whether the above argument is correct or not and state the reason.
15. Four cards are drawn from a pack of cards, Find the probability that (i) there is one card of each suit, and (ii) there are two spades and two hearts.
16. A and B play a game in which their chances of winning are in the ratio 3:2. Find A's chance of winning at least three games out of the five games played.
17. Using Lagrange approach, optimize $f(x, y) = xy$ with respect to the constraint $x + 4y = 120$.
18. Discuss the travelling salesman problem in AI with an example.

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

19. Discuss how graphs / trees can be used in problem solving in AI.
20. Prepare a detailed note on descriptive statistics.
21. Write short notes on gradient of matrices.
22. Calculate the coefficient of x^0 in $(3x^2 - \frac{2}{x})^{15}$

(5 x 2 = 10 Weight)