Reg. No ..... Name **24U452**

END SEMESTER EXAMINATION - MARCH 2024

SEMESTER 4 - INTEGRATED M.Sc. PROGRAMME COMPUTER SCIENCE

COURSE : **21UP4CRMCP13 - BASICS OF ARTIFICIAL INTELLIGENCE**

(For Regular 2022 Admission and Improvement / Supplementary - 2021 Admission)

Time : Three Hours Max. Weightage: 30

PART A

Answer any 8 Questions

1. The value of generating function $1 + a + a^2 + a^3 + \ldots\ldots = $
2. If the proposition *p* states "I bought a lottery ticket this week.", and *q* states "I won the million dollar jackpot.", express the proposition ¬*p* ∨ (*p* ∧ *q*) in English sentences.
3. The value of the generating function $1 - x + x^2 - x^3 + x^4 - \ldots\ldots\ldots = $
4. Write the formula to find the derivative of a real-valued function using first principle.
5. State the derivative of logistic function.
6. List any two examples of variables that would be strongly correlated.
7. The binomial expansion of e^x is _____.
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. When a die is rolled, let A be the event that an even number turns up and let B be the event that a number divisible by 3 occurs. Find $P(A \cup B)$ and $P(A \cap B)$.
10. List any four heuristic search techniques commonly used in AI-based problem solving.

(1 x 8 = 8 Weight)

PART B

Answer any 6 Questions

11. Explain the hill climbing algorithm with an example.
12. Discuss the right shift rule of generating functions with an example.
13. 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.
14. Find the value of $\lim_{x \to 1} \left[\frac{x-2}{x^2-x} - \frac{1}{x^3-3x^2+2x} \right]$
15. A box contains 6 red, 4 white and 5 black balls. A person draws 4 balls from the box at random. Find the.probability that among the balls drawn, there is at least one ball of each colour.
16. Discuss the various applications of Propositional logic.
17. Perform a critical comparison of breadth-first and depth-first search algorithms.
18. Find $\frac{dy}{dx}$, if $y + \sin y = \cos x$.

(2 x 6 = 12 Weight)

PART C
Answer any 2 Questions

19. Discuss the characteristics of an AI-based problem based on which it can be categorized.

20. Find $\frac{\mathrm{d}\,y}{\mathrm{d}\,x}$ of the following functions:

    (a). $\mathrm{y} = \cos^{-1}\left(\frac{1-\mathrm{x}^2}{1+\mathrm{x}^2}\right),\ 0 < \mathrm{x} < 1$

    (b). $\mathrm{y} = \sin^{-1}\left(\frac{2\mathrm{x}}{1+\mathrm{x}^2}\right)$

21. Elaborate on the Gaussian distribution with its main characteristics.

22. Find the generating function of the sequence: $0^2,\ 1^2,\ 2^2,\ 3^2,\ 4^2,\ \ldots.$

(5 x 2 = 10 Weight)