Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐☐   Total No. of Pages : 03

Total No. of Questions : 09

B.Tech. (AI&ML)/ (Artificial Intelligence (AI) and Data Science)/ (CSE)/ (IOT)/ (IT)/ (Internet of Things and Cyber Security including Block Chain Technology) (Sem–2)

MATHEMATICS-II

Subject Code : BTAM204-18

M.Code : 91960

Date of Examination : 20-06-2023

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :
1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C. have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

l. Solve :

a) Find the mean of the following numbers

3, 6, 8, 10, 13, 4, 5, 9, 15.

b) The median the following data, arranged in ascending order, is 16. Find c

1, 3, 5.5, 9, c + 1, c + 7, 15, 19, 27, 36.

c) A coin is tossed and a dice is rolled simultaneously. Find the probability of getting a head and an even number.

d) For a moderately skewed data, the arithmetic mean is 200, the coefficient of variation is 8 and Karl Pearson's coefficient of skewness is 0.3. Find the mode.

e) If $n = 4$, $\sum D^2 = 3$, what is the coefficient of rank correlation?

f) Find the probability distribution of the number of heads when two coins are tossed simultaneously.

g) A random sample of 900 members has a mean height of 1.75 meters. Can it be reasonably regarded as a sample from a large population of mean 1.71 meters and standard deviation 1.1 meters?

h) What is principal of least squares?

i) Find the value of k such that the following function is a probability density function.

$$f(x) = \begin{cases} kx^3, & 0 \le x \le 8 \\ 0, & otherwise \end{cases}$$

j) The percentage of officials in two big PSU companies with computer knowledge is 30 and 25 respectively. Is this difference likely to be hidden in sample of 1000 and 800 officials, respectively from the two PSU's?

SECTION-B

2. a) Calculate the median of the following frequency distribution:

Marks	20-30	30-40	40-50	50-60	60-70	70-80
No. of students	3	5	20	10	5	3

b) A problem in statistics is given to three students whose chances of solving it are 0.5, 0.3 and 0.25. What is the probability that only of them solve it correctly?

3. a) Consider the data: 3, 5, 6, 9, 11. Find the second and third moments about the mean.

b) A coin is tossed until a head appears. What is the expectation of the number of tosses required?

4. If the mean of a Binomial Distribution is 3 an variance is 3/27. Find the probability of obtaining at least 4 successes.

5. Find the coefficient of correlation between the values of X and Y given below:

X	2	3	4	5	6	7	8
Y	7	6	5	4	3	2	1

SECTION-C

6. A continuous random variable X has a probability density function

$$f(x) = 3x^2, \ 0 \leq x \leq 1.$$

Find a and b such that

a) $P(x \leq a) = P(x > a)$

b) $P\{x > b\} = 0.05$

7. Can vaccination be regarded as preventive measure of small pox, as evident by following the data of 1482 persons exposed to small pox in a locality? 343 persons were vaccinated. Out of 1482, only 368 persons were affected by the virus in total and out of 343 vaccinated persons, only 35 persons were affected.

8. The random variable X is normally distributed with mean 9 and standard deviation 3. Find the probability

a) $X \geq 15$

b) $X \leq 15$

c) $0 \leq X \leq 9$

It is given that $P(0 \leq Z \leq 3) = 0.4987$ and $P(0 \leq Z \leq 2) = 0.4772$.

9. Fit a parabola $y = a + bx + cx^2$ to the following data of the sales of a company in different years :

Year	1976	1977	1978	1979	1980
Sales (in lakhs)	77	88	94	85	91

NOTE : Disclosure of Identity by writing Mobile No. or Marking of passing request on any paper of Answer Sheet will lead to UMC against the Student.