Roll No. | | | | | | | | | | | | | **Total No. of Pages : 03**

Total No. of Questions : 09

B.Tech. (AI&ML/AI&DS/DS/CSE/IT/ME/Internet of Things and Cyber Security including Block Chain Technology) (Sem.–02)

MATHEMATICS-II

Subject Code : BTAM204-18

M.Code : 91960

Date of Examination : 22-12-2025

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 at least TWO questions from SECTION - B & C.**

SECTION - A

l. Answer the following :

a) Find the Mode from the following data: 8, 9, 11, 16, 11, 23, 21, 27, 21, 35, 21, 7, 11.

b) Two dice are rolled once. Find the probability that the numbers on the two dice are different.

c) For a moderately skewed data, the arithmetic mean is 50, the coefficient of variation is 2 and Karl Pearson's coefficient of skewness is 0.1. Find the mode.

d) If $n = 5$, $\Sigma D^2 = 6$, what is the coefficient of rank correlation?

e) **Find E(X) for the following probability distribution :**

X :	8	12	16	20	24
P(X) :	1/8	1/6	3/8	1/4	1/12

f) Find the mean of Poisson distribution.

g) A random sample of 450 virus cultures has a mean life time of 0.875 days. Can it be reasonably regarded as a sample from a large population of mean 0.85 days and standard deviation 0.6 days?

h) Explain the method of least squares to fit a parabola.

i) **Find the value of c such that the following function is a probability density function :**

$$f(x) = \begin{cases} cx^2, & 1 \le x \le 2 \\ 0, & elsewhere \end{cases}$$

j) Write two properties of x^2-test.

SECTION - B

2. a) The probability that a 50 year old man will be alive at 60 is 0.83 and the probability that a 45 year old woman will be alive at 55 is 0.87. What is the probability that a man who is 50 and his wife who is 45 will both be alive 10 years hence?

b) **Calculate median age from the following data :**

Age(year)	5-14	15-24	25-34	35-44	45-54	55-64	65-74
No. of females	420	300	206	205	133	86	40

3. a) Consider the set of data 2, 3, 7, 8, 10. Find the first and second moment about the arbitrary value 4.

b) A die is rolled until 6 appears. What is the expectation of the number of rolling's required?

4. If the mean of a Binomial Distribution is 5 and variance is 3. Find the probability of obtaining at least 5 failures.

5. **Find the co-efficient of correlation between the values of X and Y given below :**

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

SECTION - C

6. The standard deviation of the size of snail population is 2.70 cm. Find the probability that in a sample of size 66, the sample mean will differ from the population mean by 0.75 or more.

7. A sample analysis of examination results of 200 engineering students was made. It was found that 46 students failed, 68 secured a second division and rest were placed in first division. Are these figures align with the general examination result which is in the ratio of 4:3:2:1 for various categories respectively?

8. a) If X has an exponential density function

$$f(x) = \begin{cases} \frac{1}{\sigma} e^{-x/\sigma}, & x \geq 0 \\ 0, & otherwise \end{cases}$$

Find mean and variance of X.

b) **If the probability density function of a continuous random variable X is given by :**

$$f(x) = \begin{cases} kx^2; & 0 < x < 1 \\ 0; & otherwise \end{cases}$$

Find the value of k and hence compute its mean and variance.

9. **Fit the curve $y = a + bx^2$ to the data :**

x	10	20	30	40	50
y	8	10	15	21	30

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.