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

Total No. of Questions: 09

B.Tech All (Sem. – 2)

MATHEMATICS-II

Subject Code: BTAM- 204-18

M Code: 76257

Date of Examination : 23-01-23

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, carrying EIGHT marks each.**
3. **Students have to attempt any FIVE questions from SECTION B & C, selecting atleast TWO questions from each of these SECTIONS B & C.**

SECTION-A

1. Answer the follwoing:

   a) Name any four measures of dispersion.

   b) Define kurtosis.

   c) Two cards are drawn at random from a well-shuffled pack of 52 cards. What is the probability of drawing two aces?

   d) Give the formula of mean and standard deviation for Poisson distribution.

   e) Write any four properties of normal distribution.

   f) Find the coefficient of correlation of two independent variables x and y.

   g) Write the normal equations for the curve $x=b+cy$.

   h) Define standard error of mean and level of significance.

   i) Define Type-II error.

   j) Define null hypothesis.

SECTION-B

2. a) Calculate standard deviation from the table giving marks distribution of 112 students:

Marks	$20-30$	$30-40$	$40-50$	$50-60$	$60-70$	$70-80$	$80-90$
No. of students	5	14	24	27	18	15	9

b) The first four moments of distribution about the value 5 of the variable are 2, 20, 40 and 50. Obtain the moments about mean.

3. a) Two unbiased dice are thrown. Find the expected values of the sum of numbers of points on them.

b) A and B take turns in throwing two dice, the first to throw 10 being awarded the prize. If A starts first, find their chances of winning.

4. a) A man tosses a fair coin 10 times. Find the probability that he will have:

i) Not more than 5 heads

ii) A minimum of 4 heads

b) A manufacturer of cotter pins knows that 5% of his product is defective. If he sells cotter pins in boxes of 100 and guarantees that not more than 10 pins will be defective, what is the approximate probability that a box will fail to meet the guaranteed quality?

5. a) If X is normally distributed and the mean of X is 30 and the standard deviation is 5 . Find out the probability of the following:

i) $X \geq 45$

ii) $26 \leq X \leq 40$

b) Marks obtained by 10 students in Mathematics and Statistics are given below. Find the coefficient of correlation between the two subjects.

Mathematics	75	30	60	80	53	35	15	40	38	48
Statistics	85	45	54	91	58	63	35	43	45	44

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

i) $P\{X \leq a) = P\{X > a\}$

ii) $P\{X > b\} = 0.05$

7. Fit a parabola of second degree to the data:

Time (sec)	1	2	3	4	5
Distance (feet)	15	70	140	250	380

8. a) The mean produce of wheat of a sample of 100 fields is 200kg per acre with a standard deviation of 10kg. Another sample of 150 fields has the mean at 220kg with a standard

deviation of 12kg. Assuming the standard deviation of the yield at 11kg, find out if there is a significant difference between the mean yields of the two samples.

b) A random sample of 500 pineapples was taken from a large consignment and 65 were found to be bad. Find the standard error of the proportion of bad ones in a sample.

9. a) Test whether the colour of the son's eyes is associated with that of the father's as per the data given below:

		Eye colour of sons	
		Black	Brown
Eye colour of fathers	Black	2	10
	Brown	6	6

(Take $\chi^2_{0.05}$ for 1 degree of freedom $= 3.841$)

b) The mean height of 50 male students who participate in college athletics was 68.2 inches with a standard deviation of 2.5 inches; while 50 male students who do not participate in athletics had a mean height of 67.5 inches with a standard deviation of 2.8 inches. Test the hypothesis that male students who participate in college athletics are taller than other male students.

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.