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B.Tech. (AI&DS/ML/Block Chain/CSE/Cyber Security/

CS/EEE/EE/IT/IOT) (Sem.-3)

MATHEMATICS-III (PROBABILITY AND STATISTICS)

Subject Code : BTAM-302-23

M.Code : 94630

Date of Examination : 04-06-2025

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** contains **FIVE** questions carrying **FIVE** marks each and students have to attempt any **FOUR** questions.
3. **SECTION-C** contains **THREE** questions carrying **TEN** marks each and students have to attempt any **TWO** questions.

SECTION - A

- 1. Write briefly :**
- a) What do you mean by Kurtosis?
 - b) Define sample space and an event of a random experiment. Also, give example.
 - c) A die is thrown at random. Find the probability that the number on it is even.
 - d) Define binomial distribution.
 - e) Write down the mean and variance of Poisson distribution.
 - f) What do you mean by Regression?
 - g) Give an example of a positive correlation.
 - h) Define Standard Error of a sampling distribution of a statistic.
 - i) Give an example of a small sample.
 - j) What are the uses of Chi-square test?

SECTION - B

2. Calculate the first four moments about the mean for the following data :

$x:$	1	2	3	4	5	6	7	8	9
$f:$	1	6	13	25	30	22	9	5	2

3. A random variable X has the following probability distribution

X	0	1	2	3	4	5	6
$P(X)$	k	$3k$	$5k$	$7k$	$9k$	$11k$	$13k$

Find : a) the value of k b) $P(X \geq 4)$ and $P(2 < X \leq 5)$.

4. If X is a normal variate with mean 30 and standard deviation 5, find the probabilities that

a) $26 \leq X \leq 40$ b) $X \geq 45$.

5. By using the method of least squares, find the straight line of the form $y = a + bx$ that fits the following data :

$x:$	100	120	140	160	180	200
$y:$	0.45	0.55	0.60	0.70	0.80	0.85

6. A sample of 20 items has mean 42 units and standard deviation 5 units. Test the hypothesis that it is a random sample from a normal population with mean 45 units.

SECTION - C

7. Define Poisson distribution. Fit a Poisson distribution to the following data :

$x:$	0	1	2	3	4
$f:$	123	59	14	3	1

8. Calculate the coefficient of correlation for the ages of husbands and wives :

Age of husband (Years)	23	27	28	29	30	31	33	35	36	39
Age of wife (Years)	18	22	23	24	25	26	28	29	30	32

9. What is Chi-square test? A dice is thrown 90 times with the following results :

Face :	1	2	3	4	5	6	Total
Frequency :	10	12	16	14	18	20	90

Use Chi-square test to test whether these data are consistent with the hypothesis that the dice is unbiased. Given that $\chi^2_{0.05} = 11.07$ for 5 degrees of freedom.

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