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Total No. of Questions: [09]

B. Tech. (CSE) (Semester: 2nd)
MATHEMATICS-II (PROBABILITY AND STATISTICS)
Subject Code: BMATH1201
Paper ID: [18111109]

Time: 03 Hours **Maximum Marks: 60**

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A **(2 marks each)**

Q1. Attempt the following:

a. Prove that the sum of two independent Poisson variates is also a Poisson variate.
b. Find the expectation of the number on a die when thrown.
c. Obtain the mean of the exponential distribution with parameter θ.
d. Joint distribution of two random variables X and Y is given by $f(x) = 4xye^{-(x^2+y^2)}$; $x \geq 0,\ y \geq 0$. Test whether X and Y are independent?
e. Discuss the effect of change of origin and scale on moments about mean.
f. Prove that if one of the regression coefficients is greater than unity, the other must be less than unity.
g. Give different measures of skewness.
h. Write a short note on the principal of least squares.
i. Explain type I and type II errors.
j. What are the conditions for the validity of χ^2 test?

Section – B **(5 marks each)**

Q2. State and prove Chebychev's inequality.

Q3. Obtain the moment generating function of normal distribution.

Q4. Discuss about kurtosis in detail with the help of frequency curve.

Q5. Out of 8000 graduates in a town 800 are females; out of 1600 graduate employees 120 are females. Use χ^2 test to determine if any distinction is made in appointment on the basis of sex. Value of χ^2 at 5% level for one degree of freedom is 3.84.

Q6. A random sample of 10 boys had the following I.Q's: 70, 120, 110, 101, 88, 83, 95, 107, 98, 100. Do these data support the assumption of a population mean I.Q. of 100 at 5% level of significance. $t_{0.05}$ for 9 degrees of freedom is 2.262.

Section – C **(10 marks each)**

Q7. Ten competitors in a musical test were ranked by three judges A, B and C in the following order:

Ranks by A:	1	6	5	10	3	2	4	9	7	8
Ranks by B:	3	5	8	4	7	10	2	1	6	9
Ranks by C:	6	4	9	8	1	2	3	10	5	7

Using rank correlation method, discuss which pair of judges has the nearest approach to common liking in music.

Q8. (a) Obtain the recurrence relation for the moments of binomial distribution and hence obtain first three moments.

(b) The probability distribution of a random variable X is $f(x) = k \sin sin \frac{1}{5}\pi x$, $0 \leq x \leq 5$.

Determine the constant k and obtain the median and quartiles of this distribution.

Q9. Random samples drawn from two countries gave the following data relating to the heights of adult males:

	Country A	Country B
Mean Height (in inches)	67.42	67.25
Standard deviation (in inches)	2.58	2.50
Number in Samples	1000	1200

(i) Is the difference between means significant?

(ii) Is the difference between standard deviations significant?