Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 18MATP114

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

MCA I Year II Semester (R18) Supplementary End Semester Examinations, September - 2024

PROBABILITY & STATISTICS

Time: 3Hrs **Max Marks: 60**

Attempt all the questions. All parts of the question must be answered in one place only.
In Q.No 1 to 5 answer either A or B only

Q.No	Question	Marks	CO	BL
Q.1(A)	When a computer goes down, there is a 75% chance that it is due to an overload and a 15% chance that it is due to software problem. There is an 85% chance that it is due to an overload or a software problem. What is the probability that (i) both the problems are at fault (ii) there is software problem but not overload (iii) there is an overload problem but not software problem (iv) neither software problem nor overload problem?	12M	1	2
	OR			
Q.1(B)	Let X denote, the number of holes that for can be drilled per bit. The density for X is given the following table:	12M	1	3

x	1	2	3	4	5	6	7	8
$f(x)$	0.02	0.03	0.05	0.2	0.4	0.2	0.07	$f(8)$

(a) Find $f(8)$

(b) Find the table for F

(c) Use F to find the probability that a randomly selected bit can be used to drill between three and five holes inclusive.

(d) Find $p(X \le 4)$ and $p(X < 4)$. Are these probabilities the same?

Q.2(A)	For the following bivariate probability distribution find (i) marginal distributions of X and Y (ii) Conditional distribution of X given Y (iii) E[X] and E[Y]	12M	2	3

X\Y	0	1	2
0	1/15	2/15	1/15
1	3/15	2/15	1/15
2	2/15	1/15	2/15

OR

Q.2(B)	The joint density for (X,Y) is given by $f(x,y)=\frac{x^3y^3}{16} \quad 0 \le x \le 2, 0 \le y \le 2$	12M	2	3

(i) Find the marginal densities for X and Y.

(ii) Are X and Y independent?

(iii) Find $P(X \le 1)$.

(iv) Find $p(X \le 1, Y \le 1)$

Q.3(A)	Find the Moment generating function of Poisson Distribution and then find mean and variance.	12M	3	3
	OR			
Q.3(B)	Among diabetic, the fasting blood glucose level X may be assumed to be approximately normally distributed with mean 106 milligrams and S. D. 8 milligrams.	12M	3	3

a) Find the probability that randomly selected diabetic will have blood glucose level between 90 and 122 mg.

b) Find $P[X \le 120\text{mg}]$

c) Find $P[X > 110\text{mg}]$

Q.4(A)	A new computer network is being designed. The makers claim that it is compatible with more than 99% of the equipment already in use. a. Set up the null and alternative hypothesis needed to get evidence to support this claim. b. A sample of 300 programs is run, and 298 of these run with no changes necessary. That is, they are compatible with the new network. Can H_0 be rejected?	12M	4	2
	OR			
Q.4(B)	A machinist is making engine parts with axle diameters of 0.700 inch. A random sample of 10 parts shows a mean diameter of 0.742 inch with a standard deviation of 0.040 inch. Construct 95% confidence limits for true mean axle diameter.	12M	4	3
Q.5(A)	The following table shows the lives in hours of four brands of electric lamps: Brand A: 1610, 1610, 1650, 1650, 1680, 1700, 1720, 1800 B: 1580, 1640, 1640, 1700, 1750 C: 1460, 1550, 1600, 1620, 1640, 1660, 1740, 1820 D: 1510, 1520, 1530, 1570, 1600, 1680 By shifting the origin to 1640 in the above mentioned data, for simplification in calculation, perform an analysis of variance and test the homogeneity of the mean lives of the four brands of lamps.	12M	5	4
	OR			
Q.5(B)	The following data resulted from an experiment to compare three burners B_1, B_2 and B_3. A Latin square design was used as the tests were made on three engines and were spread over 3 days. Engine 1 Engine 2 Engine 3 Day 1 B_1-16 B_2-17 B_3-20 Day 2 B_2-16 B_3-21 B_1-15 Day 3 B_3-15 B_1-12 B_2-13 By changing the origin to 16 for simplification in numerical computation, test the hypothesis that there is no difference between the burners.	12M	5	4

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