Reg. No.												

Question Paper Code	21330

M.E. / M.Tech. - DEGREE EXAMINATIONS, NOV/DEC 2022

First Semester

M.E. - Computer Science and Engineering

(Common to M.E. - Computer Science and Engineering (with specialization in Networks))

20PCSMA104 - APPLIED PROBABILITY AND STATISTICS

(Regulations 2020)

Duration: 3 Hours | Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks, K-Level, CO
1.	A continuous random variable X has a density function $f(x) = k(1+x)$, $2<x<5$. Find the value of k.	*2,K1,CO1*
2.	The first 2 moments about 3 are 1 and 8. Find the mean and variance.	*2,K2,CO1*
3.	The two regression lines are $4x - 5y + 33 = 0$, $20x - 9y = 107$. Find the mean of x and y.	*2,K2,CO2*
4.	The joint pdf of (X,Y) is given by $f(x,y) = e^{-(x+y)}, 0 \le x, y < \infty$. Find the marginal density function of X.	*2,K2,CO2*
5.	Mention the properties of a good estimator.	*2,K2,CO3*
6.	Define point estimate.	*2,K2,CO3*
7.	Define Type-I error and Type-II error.	*2,K2,CO4*
8.	A standard sample of 200 tins of coconut oil gave an average weight of 4.95 kg with a standard deviation of 0.21 kg. Do we accept that the net weight is 5 kg per tin at 5% level of significance?	*2,K2,CO4*
9.	Define random vector.	*2,K2,CO5*
10.	Define Principal component analysis.	*2,K2,CO5*

PART - B (5 × 16 = 80 Marks)

Answer ALL Questions

11. a) A discrete RV X has the probability function given below — *16, K3,CO1*

X	0	1	2	3	4	5	6	7
P(x)	0	a	2a	2a	3a	a^2	$2a^2$	$7a^2 + a$

Find (i) Value of a (ii) $p(X<6)$, $P(X \ge 6)$, $P(0<X<4)$
(iii) Distribution function.

OR

b) (i) Find the Moment generating function of Binomial distribution and hence find its mean and variance. *8,K2,CO1*

(ii) State and Prove memoryless property of Exponential distribution. *8,K2,CO1*

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

12. a) From the following data , Find (i)The two regression equations (ii) The coefficient of correlation between marks in Mathematics and marks in Statistics (iii) The most likely marks in Statistics when marks in Mathematics are 30. *16,K3,CO2*

Marks in Maths	25	28	35	32	31	36	29	38	34	32
Marksin Statistics	43	46	49	41	36	32	31	30	33	39

OR

b) If the joint pdf of a two – dimensional RV (X,Y) is given by *16,K3,CO2*

$$f(x,y) = K(6-x-y);\ 0<x<2,\ 2<y<4$$
$$= 0, \text{ elsewhere}$$

find (i) the value of K, (ii) $P(X<1, Y<3)$ (iii) $P(X+Y<3)$ (iv) $P(X<1/Y<3)$

13. a) Fit a straight line trend of the form y = a + bx to the data given below by the method of least squares and predict the value of y when x = 70 *16, K3,CO3*

x	71	68	73	69	67	65	66	67
y	69	72	70	70	68	67	68	64

OR

b) Fit a parabola of second degree to the following data. *16, K3,CO3*

X	0	1	2	3	4
Y	1	5	10	22	38

14. a) Given the following table for hair colour and eye colour, find the value of Chi-square. Is there good association between hair colour and eye colour. *16, K3,CO4*

		Hair colour			
		Fair	Brown	Black	Total
Eye colour	Blue	15	5	20	40
	Grey	20	10	20	50
	Brown	25	15	20	60
	Total	60	30	60	150

OR

b) The nicotine content in milligram of two samples of tobacco were found to be as follows, test the significant difference between means of the two samples. *16, K3,CO4*

Sample I	21	24	25	26	27	-
Sample II	22	27	28	30	31	36

15. a) Compute the principal component to the covariance matrix *16, K3,CO5*

$$\Sigma = \begin{pmatrix} 1 & 4 \\ 4 & 100 \end{pmatrix}$$

OR

b) Explain Multivariate Analysis. *16, K2,CO5*