MANIPAL INSTITUTE OF TECHNOLOGY

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A Constituent Institution of Manipal University

IV SEMESTER B.TECH. END SEMESTER EXAMINATIONS, JUNE 2024

SUBJECT: ENGINEERING MATHEMATICS IV (MAT – 2221)

AERONAUTICAL ENGINERRING

Date of Exam: 14-06-2024 Time of Exam: 2:30:00PM to 5:30PM Max. Marks: 50

Descriptive Questions

Answer all the questions.

Q.no			BL	CO	Marks
1.					
	A	A class consists of 6 girls and 10 boys. If a committee of 3 chosen at random from the class, Find the probability that i. 3 boys are selected. ii. Exactly 2 girls are selected.	3	CO1	3
	B	Suppose that the 2-dimensional Random variable (x, y) is uniformly distributed over the shaded region R bounded by $y = x$ and $y = x^2$ i. Find its pdf ii. Marginal pdf of x and y.	3	CO1	3
	C	In a class 2% of boys and 3% of girls have blue eyes. There are 30% girls in the class. If a student is selected and having blue eyes; What is the probability that the student is a girl?	4	CO1	4
2.					
	A	If X_1, X_2, X_3 be uncorrelated random variable having the same standard deviation, find Correlation coefficient between $X_1 + X_2$ and $X_2 + X_3$	3	CO1	3
	B	Traffic control engineer reports that 75% of the vehicles passing through a check post are from within state. What is the probability that fewer than 4 of the 9 are from out of the state.	3	CO2	3
	C	In a normal distribution 31% of items are less than 45 and 8% are over 64. Find mean and standard deviation of the distribution.		CO2	4
3.					
	A	If $\bar{x}$ is Mean of random sample of size 5 taken from normal distribution of $\mu = 0$ and $\sigma^2 = 125$ Determine so that $p(\bar{x} < c) = 0.9$	4	CO3	3
	B	Two Independent random variable X and Y having pdf $f(x) = e^{-x}$: $g(y) = 2e^{-2y}$ $0 \leq x$, $y \leq \infty$ Find Pdf of (X+Y).	3	CO3	3
	C	Find MGF of Poisson's distribution, hence find mean and variance of Poisson's distribution.	4	CO3	4
4					
	A	Compute the median for the following data.	3	CO4	3

class	0-10	10-20	20-30	30-40	40-50
frequency	5	15	25	8	7

B	The number of patients recovering in ICU in a Hospital is a random variable with mean 18 and standard Deviation 2.5. Determine the minimum Probability that the number of patients are between 8 and 28. using Chebyshev's inequality.	4	CO1	3
C	Fit a parabola for the following data.	3	CO4	4

x	1	2	3	4	5
y	4	3	6	7	11

5.

A	Obtain the recurrence relation $\frac{d}{dx}\{x^n J_n(x)\} = x^n J_{n-1}(x)$.	3	CO5	3
B	Express $f(x) = x^4 + 3x^3 - x^2 + 5x - 2$ in terms of Legendre polynomial.	3	CO5	3
C	Solve the given equation by power series method $\frac{d^2y}{dx^2} + xy = 0$.	3	CO5	4