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# Manipal Institute of Technology, Manipal



(A Constituent Institute of Manipal University)

## IV SEMESTER B.TECH (AUTOMOBILE ENGINEERING)

### MAKE UP END SEMESTER EXAMINATIONS, JUNE / JULY 2016

#### SUBJECT: ENGINEERING MATHEMATICS-IV [MAT 2202]

#### **REVISED CREDIT SYSTEM**

Time: 3 Hours

MAX. MARKS: 50

#### Instructions to Candidates:

- ✤ Answer ALL the questions.
- Each question carries equal marks (3 + 3 + 4).

1A.	A and B throw alternatively a pair of fair dice. A wins if he throws sum 5 before B throws a sum 7 and B wins if he throws a sum 7 before A throws a sum 6. If A begins, find his chances of winning.									
	The random variable X has the following probability function:									
	x -2 -1 0 1 2 3									
1B.	P(x) 0.1 K 0.2 2K 0.3 K	3								
	i) Find the value of k									
	ii) Calculate mean and variance.									
1C.	Let $\overline{X}$ be the mean of random sample of size 5 from a normal distribution N (0, 125). Find C, so that P{ $\overline{X} < C$ }= 0.9.									
2A.	State Central limit theorem. If the mean breaking strength of copper wire is 575 lbs with a standard deviation of 8.3 lbs then find the sample size 'n' such that $P(\overline{X} < 572) = 0.01$									
2B.	Three machines A, B, C produce respectively 60%, 30%, 10% of the total number of items of a factory. The percentages of defective output of these machines are respectively 2%, 3% and 4%. An item is selected at random and is found to be defective. Find the Probability that the item was produced by machine $C$									
2C.	Suppose that joint pdf of the two dimensional random variable (X, Y) is given by $f(x,y) = \begin{cases} x^2 + \frac{xy}{3}, & 0 \le x \le 1, \ 0 \le y \le 2\\ 0 & \text{elsewhere} \end{cases}$	4								

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	Compute (i) $P(X \ge Y)$ ii) P	$P(X+Y\geq 1)$	)									
3A.	Find the mean and variance of	Poisson Dis	strib	utior	n.							3
3B.	If X is uniformly distributed in (0, 1) then find the pdf of $Y = e^{X}$ . Also find E(Y).								<sup>d</sup> 3			
3C.	Using Simplex method, solve the following LPP, maximize $Z = 5x_1+3x_2$ subject to $x_1 + x_2 \le 2, 5x_1 + 2x_2 \le 10, 3x_1 + 8x_2 \le 12, x_1, x_2 \ge 0.$								4			
4A.	Find the mgf of a random variable which is uniformly distributed over (-a, a). Hence evaluate $E(X^{2n})$ .								3			
4B.	Obtain the lines of regression the following data: X: 1 2 Y: 9 8	and hence 1 3 4 10 12	find 2	the 6 5 11	coef	ficie 6 13	ent o	of co 7 14	orrel	atio	n fo	r 3
4C.	The random variable (X, Y) has $f(x,y) = \begin{cases} (x+y) & 0 \le x \\ 0 & 0 \end{cases}$ coefficient between X & Y	as joint pdf $x \le 1, 0 \le y \le elsewhere$	give ≤ 1	n by Con	nput	te th	e co	rrela	atior	1		4
5A.	The income of a group of 10,000 persons was found to be normally distributed with mean Rs.750 and standard deviation of Rs.50. Find the number of persons out of 10,000 who have income exceeding Rs.668 and those who have income exceeding Rs. 832?. Also, find the lowest income among the richest 100?							3				
5B.	Fit a straight line $y = ax + b t$ x  1  2 y  6  4	o the following $3$ $4$ $3$ $4$	wing 4 5	5 dat	a.	6 2						3
5C.	Using M- method, solve the f $3x_1 + x_2 = 3, 4x_1 + 3x_2 \ge 6, x_1 \le 10^{-10}$	ollowing LF $x_1 + 2x_2 \le 3$	PP, 1 x <sub>1</sub> ,	ninii x <sub>2</sub>	miz ≥ 0	e Z ).	= 2:	<b>x</b> <sub>1</sub> +2	x <sub>2</sub> s	ubje	ect to	9 4