

MANIPAL INSTITUTE OF TECHNOLOGY

A Constituent Institution of Manipal University

IV SEMESTER B.TECH. (AUTOMOBILE ENGINEERING)

END SEMESTER EXAMINATIONS, APRIL/MAY 2017

SUBJECT: ENGINEERING MATHEMATICS-IV (MAT 2202)

REVISED CREDIT SYSTEM (16/05/2017)

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- ✤ Answer ALL the questions.
- Missing data may be suitably assumed.

1A.	Suppose that the life lengths of 2 electronic devices say D_1 and D_2 have distributions N(40,36) and N(45,9) respectively. If electronic device is to be used for a 45 hour period, which device is to be preferred?. If it is to be used for a 48 hour period which device is to be preferred?.										4	
1B.	Find the probability that among 7 persons a). No two were born on the same day b). At least two were born on the same day c). Two were born on a Sunday and two on a Tuesday of the week.											3
1C.	Derive the mean and variance of binomial distribution.										3	
2A.	Find th x y	ne co 105 101	0rrelation 104 103	n coeffic 102 100	cient b 101 98	etwe 100 95	een x and) 99 96	l y from 98 104	n the gi 96 92	93 97	data. 92 94	4
2B.	Calcul the age Age in years No. of membe	Calculate the mean and standard deviation for the following table giving the age distribution of 542 members.Age in years20-3030-4040-5050-6060-7070-8080-90No. of members361132153140512									80-90	3
2C.	A two dimensional random variable (X,Y) has joint pdf										3	

	$f(x, y) = \begin{cases} x^2 + \frac{xy}{3} & \text{if } 0 < x < 1, 0 < y < 2\\ 0 & \text{elsewhere.} \end{cases}$ Then find marginal pdf of X, marginal pdf of Y and evaluate									
	$P(X+Y\geq 1).$									
3A.	Suppose that the random variable X has the pdf $f(x) = \frac{1}{2}e^{- x }, -\infty < x < \infty$. Then find the mgf of X and hence obtain E(X) and V(X).									
	Fit a straight line to the following data.									
3B.		X	1	2	3	4	6	8	3	
		у	2.4	3	3.6	4	5	6		
3C.	Solve the following LPP by using graphical method. Maximize $Z=3x_1 + 4x_2$, subject to $4x_1 + 2x_2 \le 80$, $2x_1 + 5x_2 \le 180$, x_1 , $x_2 \ge 0$.									
4A.	Solve the given LPP using Penalty cost method. Minimize $Z = 2x_1 + x_2$ subject to $3x_1 + x_2 = 3$, $4x_1 + 3x_2 \ge 6$, $x_1 + 2x_2 \le 3$, x_1 , $x_2 \ge 0$.									
4B.	Let \overline{X} denote mean of a random sample of size 100 from a distribution $\chi^2(50)$. Compute $P(49 < \overline{X} < 51)$.									
4C.	The chance that a doctor 'A' will diagnose a disease correctly is 60%. The chance that a patient of 'A' will die after correct diagnosis is 40% and the chance of death by wrong diagnosis is 70%. If a patient of 'A' dies, what is the chance that his disease was correctly diagnosed?.								3	
5A.	A coin is known to come up head 3 times as often as tail. This coin is tossed 3 times. Let X be the number of heads that appear. Write out the probability distribution of X, cdf of X and also find $E(X)$.								4	
5B.	Using simplex method, solve the LPP: Maximize $Z=5x_1+3x_2$ subject to $x_1+x_2 \le 2$, $5x_1+2x_2 \le 10$, $3x_1+8x_2 \le 12$, $x_1, x_2 \ge 0$.									
5C.	The random variable X has the pdf $f(x) = \begin{cases} 2x, & 0 \le x \le 1\\ 0, & \text{elsewhere.} \end{cases}$. Find the pdf of Y=e ^{-X} .									