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MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL (A constituent unit of MAHE, Manipal)

IV SEMESTER B.TECH. (AUTOMOBILE ENGINEERING)

END SEMESTER EXAMINATIONS, APRIL 2018

SUBJECT: ENGINEERING MATHEMATICS-IV (MAT 2202)

REVISED CREDIT SYSTEM

Time: 3 Hours

Date : 19/04/2018

MAX. MARKS: 50

Instructions to Candidates:

✤ Answer ALL the questions.

✤ Missing data may be suitable assumed.

1A.	Diameter of an electric cable is assumed to be a continuous random variable with pdf $f(x) = \begin{cases} 6x(1-x) & for \ 0 < x < 1 \\ 0 & , elsewhere \end{cases}$ (i) Obtain expression for c.d.f. (ii) Compute $P\left\{X \le \frac{1}{2} \mid \frac{1}{3} \le X \le \frac{2}{3}\right\}$							4					
1B.	Two that resp	o persons the first ective ch	s A and t who nances	d B tos get th of wi	ss an u ne hea nning.	inbiase id win	ed coin s. If A	alter Astar	nately ts the	on un game	dersta e, find	nding I their	3
1C.	Solve by Graphical method; Maximize $z = 10x_1 + 15x_2$ Subject to $2x_1 + x_2 \le 26, 2x_1 + 4x_2 \le 56, -x_1 + x_2 \le 5, x_1, x_2 \ge 0.$						3						
2A.	Der	ive the m	nean ai	nd var	iance	of exp	onenti	al dist	ributio	on.			4
2B.	Psyc 10 s ratic corr	chologica tudents. on (I.R) a elation. I.R E.R	al tests Here i and en 105 101	s of int s a rec gineer 104 103	tellige cord of ing rat 102 100	nce an f ungro tio (E.) 101 98	d engi ouped R). Ca 100 95	neerin data s lculat 99 96	ng ratio howin e co-e 98 104	o were g inte fficier 96 92	e appl lligen nt of 93 97	ied to ce 92 94	3

2C.	Let X be a random variable with the pdf $(x) = \begin{cases} 2x, & 0 \le x \le 1 \\ 0, & elsewhere \end{cases}$. Find the pdf of $Y = 3X + 1$.						
3A.	Find Pearson's coefficient of skewness for the following data. Class 10-19 20-29 30-39 40-49 50-59 60-69 70-79 80-89 Frequency 5 9 14 20 25 15 8 4	4					
3B.	The number of telephone lines busy at a particular time is a binomial variable with probability 0.1 that a line is busy. If 10 such lines are selected at random, what is the probability that (i) no line is busy (ii) at least one line is busy (iii) at most two lines are busy						
3C.	Suppose that two dimensional random variable (X, Y) is uniformly distributed in the region bounded by $y = x$ and $= x^2$. Find marginal pdf of <i>X</i> and <i>Y</i> .						
4A.	Solve by simplex method; Maximize $z = 2x_1 + 4x_2 + 3x_3$ subject to $3x_1 + 4x_2 + 2x_3 \le 60, 2x_1 + x_2 + 2x_3 \le 40,$ $x_1 + 3x_2 + 2x_3 \le 80, x_1, x_2, x_3 \ge 0.$						
4B.	A machine M_1 produces 1000 articles of which 20 are defective, M_2 produces 4000 articles of which 40 are defective, M_3 produces 5000 articles of which 50 are defective. All these articles are piled up and an article picked from the pile was found defective, what is the probability that it is from M_1 .						
4C.	Suppose that life length of two electronic devices say D_1 and D_2 have distributions $N(40,36)$ and $N(45,9)$ respectively. If the electronic device is to be used for 45 hours period, which device is to be preferred?						
5A.	X 0 1 2 3 4 Y 1 1.8 1.3 2.5 6.3	4					
5B.	If X is a random variable taking the values 0,1,2,, and $P(x) = ab^x$ where a and b are positive numbers such that $a + b = 1$. If $E(X) = m_1$ and $E(X^2) = m_2$, show that $m_2 = m_1(1 + 2m_1)$.						
5C.	Suppose X has pdf $f(x) = \frac{e^{- x }}{2}$, $-\infty < x < \infty$. Find $E(X)$ and $V(X)$ using mgf.						