

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 (21/04/2017)

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitable assumed.

1A.	The diameter of an electric cable, say X is assumed to be a continuous random variable with pdf $f(x) = \begin{cases} 6x(1-x) & \text{if } 0 \le x \le 1\\ 0 & \text{elsewhere} \end{cases}$ a) Obtain the expression for cdf b) Compute $P\left(\left(X \le \frac{1}{2}\right) \left(\frac{1}{3} < X < \frac{2}{3}\right)\right)$	4
1B.	Fit a second degree parabola to the following. X 01234Y11.81.32.56.3	3
1C.	Solve the given LPP by using graphical method. Maximize $Z=3x_1+2x_2$ subject to $-2x_1+x_2 \le 1$, $x_1+x_2 \le 3$, $x_1 \le 2$, x_1 , $x_2 \ge 0$.	3
2A.	Derive the mean and variance of exponential distribution.	4
2B.	An incomplete frequency distribution is given as below.Variable $10-20$ $20-30$ $30-40$ $40-50$ $50-60$ $60-70$ $70-80$ Frequency1230?65?2518Given that the total frequency is 229 and median is 46, find the missing frequencies.	3

2C.	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=8X ³ .	3
3A.	Compute the Karl Pearson's co-efficient of Skewness for the following data.Class interval $0-5$ $5-10$ $10-15$ $15-20$ $20-25$ $25-30$ $30-35$ $35-40$ Frequency25713211683	4
3B.	The coefficients a, b, c of the equation $ax^2 + bx + c = 0$ are determined by throwing a die three times. Find the probability that the roots are real.	3
3C.	Two independent random variables X_1 and X_2 have mean (5, 10) and variance (4, 9) respectively. Find the covariance between U=3 X_1 + 4 X_2 and V= 3 X_1 - X_2 .	3
4 A .	Let \overline{X} and S^2 be the mean and variance of a random sample of size 25 from a distribution that is N(3,100). Then evaluate $P(0 < \overline{X} < 6, 55.2 < S^2 < 145.6)$.	4
4B.	Two factories produced identical clocks. The product of the first factory consists of 10,000 clocks of which 100 are defective. The second factory produces 20,000 clocks of which 300 are defective. What is the probability that a particular defective clock is produced by the first factory?	3
4C.	Using simplex method, solve the LPP: Maximize $Z= 4x_1 + 3x_2 + 6x_3$ subject to $2x_1 + 3x_2 + 2x_3 \le 440$, $4x_1 + 3x_3 \le 470$, $2x_1 + 5x_2 \le 430$, x_1 , $x_2, x_3 \ge 0$.	3
5A.	Solve the given LPP using Penalty cost method. Maximize $Z=3x_1+2x_2$ subject to $2x_1+x_2 \le 2$, $3x_1+4x_2 \ge 12$, $x_1, x_2 \ge 0$.	4
5B.	Show that if X has the normal distribution with mean μ and variance σ^2 , $E(X - \mu)^{2n} = 1.3.5(2n-1)\sigma^{2n}$.	3
5C.	The height of 500 soldiers are found to have normal distribution. Of them, 258 are found to be within 2 cm of the mean height of 170 cm. Find the standard deviation.	3