Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

IV SEMESTER B.TECH (AUTOMOBILE ENGINEERING)

END SEMESTER EXAMINATIONS, MAY 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.	Two balls are randomly chosen from an urn containing 8 white, 4 black and 2 orange balls. Suppose that we win \$2 for each black ball selected and we loose \$1 for each white ball selected. Let X denote our winnings. Write the probability distribution of X. Find the mean and variance of X.	**3**
1B.	A lot consists of 4 bad and 6 good tubes. Tubes are selected one after the other at random (without replacement) and are tested till all the bad tubes are detected. What is the probability that the last bad tube is detected at the 5^{th} test? 10^{th} test?	**3**
1C.	Let $\overline{X}$ and S^2 be the mean and variance of a random sample of size 25 from a distribution which is N (3, 100). Evaluate i) P{ $0 < \overline{X} < 6$} ii) P{$55.2 < S^2 < 145.6$}.	**4**
2A.	Compute an approximate probability that mean of a random sample of size 15 from a distribution having pdf $f(x) = \begin{cases} 3x^2, & 0 < x < 1 \\ 0, & \text{elsewhere} \end{cases}$ is between $\frac{3}{5}$ & $\frac{4}{5}$.	**3**
2B.	State and prove Baye's theorem.	**3**
2C.	If X and Y are two random variables having the joint density function $f(x,y) = \begin{cases} \frac{1}{8}(6-x-y), & 0 \le x < 2,\ 2 \le y < 4 \\ 0, & \text{otherwise} \end{cases}$ then compute i) $P(X+Y<3)$ ii) $P(X<1/Y<3)$.	**4**
3A.	Find the mean and variance of Binomial Distribution.	**3**
3B.	If X is uniformly distributed in (0, 1) then find the pdf of $Y = e^{-X}$. Also find the E(Y).	**3**

Reg. No.										

प्रज्ञानं ब्रह्म

INSPIRED BY LIFE

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

KNOWLEDGE IS POWER — MANIPAL INSTITUTE OF TECHNOLOGY

3C.	Using Simplex method, solve the following LPP, Maximize $Z = x_1 + 1.5x_2$ subject to $x_1 + 2x_2 \leq 160,\ 3x_1 + 2x_2 \leq 240$, $x_1, x_2 \geq 0$	**4**
4A.	If $M_X(t) = e^{3t(1+t)}$ then find the pdf of $Y = \frac{(X-3)^2}{6}$. Also find the mgf of Y.	**3**
4B.	Two independent random variables X_1 and X_2 have means 5, 10 and variance 4, 9. Find the covariance between $U = 3X_1 + 4X_2$ and $V = 3X_1 - X_2$.	**3**
4C.	Compute the quartile coefficient of skew ness for the following distributions.	**4**
5A.	In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and variance of the distribution.	**3**
5B.	Fit a second degree parabola $y = ax^2 + bx + c$ to the following data.	**3**
5C.	Using M- method, solve the following LPP , maximize $z = 3x_1 + 2x_2$ subject to $2x_1 + x_2 \leq 2,\ 3x_1 + 4x_2 \geq 12,\ x_1, x_2 \geq 0$.	**4**

x	3-7	8-12	13-17	18-22	23-27	28-32	33-37	38-42
f	2	108	508	175	80	32	18	5

x	0	1	2	3	4
y	1	1.8	1.3	2.5	6.3