Reg. No. | | | | | | | | | |

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

IV SEMESTER B.TECH (CIVIL ENGINEERING)

END SEMESTER MAKEUP EXAMINATIONS, JULY 2016

SUBJECT: ENGINEERING MATHEMATICS [MAT 2205]

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

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

1A.	(i) A firm manufacturers 3 products a, b and c. the profits are \$3, \$2 and \$4 respectively. The firm has 2 machines M_1 and $M_2$and below is the required processing time in minutes for each machine on each product. Product: A, B, C Machine M_1: 4, 3, 5 Machine M_2: 2, 2, 4 Machines $M_1$and M_2have 2000 and 2500 machine-minutes respectively. The firm must manufacture 100 A's, 200 B's and 50 C's but not more than 150 A's. Set up an L.P.P. to maximize profit. (ii) Define Cannonical form of L.P.P.	**3**
1B.	Solve by the method of finite differences, $x^2y'' + xy' + (x^2 - 3)y = 0$ With $y(1) = 0$, $y(2) = 2$, and $h = 0.25$.	**3**
1C.	Obtain mean and variance of Gamma distribution.	**4**
2A.	Suppose X is uniformly distributed over the interval (0,1), find the p.d.f of $Y = X^2 + 1$.	**3**
2B.	Solve $32\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}, 0 < x < 1, t > 0$. Given $u(x,0) = u(1,t) = 0$ and $u(0,t) = t^2$.Take $h = \frac{1}{4}, \lambda = \frac{1}{3}$and compute u for four time steps.	**3**
2C.	The heights 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 of the distribution.	**4**

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3A.	If X has normal distribution with $X \sim N(\mu, \sigma^2)$, show that $E\{(X-\mu)^{2n}\} = 1.3.5 \ldots\ldots\ldots (2n-1)\sigma^{2n}$.	**3**
3B.	An airline knows that 5% of the people making reservations on a certain flight will not turn up. Consequently their policy is to sell 52 tickets for a flight that can only hold 50 passengers. What is the probability that there will be a seat available for every passengers who turns up.	**3**
3C.	Using Simplex method solve; Max z=x-3y+3z Subject to, $3x-y+2z \leq 7$ $2x+4y \geq -12$ $-4x+3y+8z \leq 10$ $x,y,z \geq 0$.	
4A.	Find the extremal of the functional $\int_0^{\frac{\pi}{2}} \left(y^2 + y'^2 - 2y\sin x\right)dx$, $y(0) = y(\pi/2) = 0$.	**3**
4B.	State Central limit theorem. A computer, in adding numbers, rounds each number off to the nearest integer. Suppose that all rounding errors are independent and uniformly distributed over (-0.5, 0.5). If 1500 numbers are added, what is the probability that the magnitude of the total error exceeds 15?	**3**
4C.	Using graphical method solve the following LPP; $Max\ Z = 4x + 3y$ subject to $x - y \leq -1$, $-x + y \leq 0$, $x, y \geq 0$.	**4**
5A.	Suppose $X_j, j = 1,2,..,50$, with $\lambda = 0.03$ having Poisson distribution. Let $S = X_1 + X_2 + \cdots + X_{50}$. Evaluate $\Pr\{S \geq 3\}$.	**3**
5B.	Show that the geodesics on a plane are straight lines.	**3**
5C.	With $h = {}^1/_3$, solve $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = -81xy$, over the region $0 < x < 1$, $0 < y < 1$. Given $u(x,1) = u(1,y) = 100$ and $u(0,\ y) = u(x,0) = 0$.	**4**

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