

## IV SEMESTER B.TECH. (CIVIL ENGINEERING) END SEMESTER MAKE UP EXAMINATIONS, JUNE 2018 SUBJECT: ENGINEERING MATHEMATICS-IV [MAT 2205] REVISED CREDIT SYSTEM

(21/6/2018)

Time: 3 Hours

## MAX. MARKS: 50

## Instructions to Candidates:

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

1A.	Solve $u_{xx} + u_{yy} = 0$ by assuming $h = \frac{1}{3}$ . Given $0 < x < 1, 0 < y < 1, u(x, 1) = u(0, y) = 0, u(1, y) = 9(y - y^2), u(x, 0) = 9(x - x^2).$							
1 <b>B</b> .	Solve $xy'' + y = 0$ , subject to the conditions $y(1) = 1$ , $y(2) = 2$ with $h = 0.25$							
1C.	Solve $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ , $0 < x < 1$ , $t > 0$ with $u(x, 0) = 100(x - x^2)$ , $u(0, t) = 0$ , $u(1, t) = 0$ choosing $h = 0.25$ by Crank-Nicolson scheme for two time steps.							
2A.	Derive mean and variance of Binomial distribution.							
2B.	The number of accidents in a year to taxi drivers in a city follows a Poisson distribution with mean 3. Out of 1000 taxi drivers find the approximately the number of the drivers with (i) No accident in a year (ii) More than 3 accidents in a year	3						
2C.	In a test on 2000 electric bulbs, it was found that the life of a particular make, was normally distributed with an average life of 2040 hours and standard deviation of 60 hours. Estimate the number of bulbs likely to burn for more than 1920 hours and but less than 2160 hours.	3						
3A.	Prove that the $n^{th}$ derivative of moment generating function at $t = 0$ gives $E(X^n)$ .							
3B.	Let X be random variable having pdf $f(x) = \begin{cases} 2x, & 0 < x \le 1 \\ 0, & elsewhere \end{cases}$ then find the pdf of $Y = 3X + 1$ .							
3C.	Two independent random variable X and Y having the pdf $(x) = e^{-x}$ , $g(y) = 2e^{-2y}$ , $0 \le x, y \le \infty$ . Find the pdf of $X + Y$ .							

## MANIPAL ACADEMY OF HIGHER EDUCATION (Deemed-to-be-University under Section 3 of the UGC Act, 1956)

4A.	Minimize $Z = x_1 - 3x_2 + 3x_3$ subject to $3x_1 - x_2 + 2x_3 \le 7$ $2x_1 + 4x_2 \ge -12$ $-4x_1 + 3x_2 + 8x_3 \le 10$ $x_1, x_2, x_3 \ge 0$ using simplex method.									
4B.	Let $\overline{X}$ denote the mean of the random sample of size 100 from the chi-square distribution with mean 50. Compute $P(49 \le \overline{X} \le 51)$ .									
4C.	Maximize $Z = 2x + 3y$ subject to $x + y \le 30$ $y \ge 3$ $0 \le y \le 12$ $x - y \ge 0$ $0 \le x \le 20$ using graphical method.									
	Solve the Transportation problem									
		Source		R	C		Availability			
5A.		1	21	16	25	13	11		4	
		2	17	18	14	23	13			
		3	33	27	18	41	19			
		Requirement	6	10	12	15	43			
5B.	Find the extremals of the functional $\int_{x_0}^{x_1} \left(\frac{{y'}^2}{x^3}\right) dx$									
5C.	Find the curve passing through the points $(x_1, y_1)$ and $(x_2, y_2)$ which when given rotated about the <i>x</i> -axis gives a minimum surface area.									