



Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)



I SEMESTER B.TECH END SEMESTER EXAMINATIONS, NOV/DEC 2015

SUBJECT: ENGINEERING MATHEMATICS I [MAT 1101]

REVISED CREDIT SYSTEM

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

✤ Answer ALL the questions.

1A.	Solve: $(x^2 + y^2 + x)dx + xydy = 0$								
1B.	Find the root of the equation $xe^x = cosx$ that lies between 0.4 and 0.6. by Regula-Falsi mehod. Carry out 4 iterations.								
1C.	The population of a town in the decennial census was as given below. Estimate the population for the year 1975								
	Year (x)	1971	1981	1991	2001	2011		3Marks	
	Population y (in thousands)	56	66	81	93	101			
2A.	If $y_1 = 4$, $y_3 = 12$, $y_4 = 19$ and $y_x = 7$ find x.								
2B.	Show that the system of equations $x_1+2x_2 - x_3 = 3$ $3x_1 - x_2 + 2x_3 = 1$ $2x_1 - 2x_2 + 3x_3 = 2$ $x_1 - x_2 + x_3 = -1$ is consistent and solve them.								
2C.	Solve : $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 2y = x + e^x \cos x$								
3A.	Solve $(2x-1)^2 \frac{d^2 y}{dx^2} + (2x-1)\frac{dy}{dx} - 2y = 8x^2 - 2x + 3$								
	MAT 1101 Page 1 of '								

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3B.	Apply Runge-Kutta fourth order method to find an approximate value of y when $x = 0.2$ given that $\frac{dy}{dx} = 1 + y^2$ and $y(0) = 0$, with $h = 0.2$									
3C.	Find the inverse of the matrix $A = \begin{bmatrix} 1 & 1 & 0 \\ 1 & -1 & 1 \\ 1 & -1 & 2 \end{bmatrix}$ using elementary row transformations.									
4A.	The following t (sec) v(m/sec) Using Sime Also estime	ing table g 0 4 pson's ru ate accele	gives the v 2 6 le find the eration at	elocity v c 4 16 e distance t = 2 se	of a particl 6 34 e moved b conds.	e at time 8 60 by the pa	t. 10 94 rticle in12	12 136 seconds.	4 Marks	
4B.	Test whether or not the set $B = \{(1, 1, 0), (3, 0, 1), (5, 2, 2)\}$ forms a basis for R^3 . If so represent (1, 2, 3) in terms of basis vectors.									
4C.	Solve the system of equations 83x + 11y - 4z = 95 7x + 52y + 13z = 104 3x + 8y + 29z = 71 by Gauss-Jacobi method. Carryout 4 iterations correct to 4 decimal places									
5A.	From the Taylor series for $y(x)$, find $y(0.1)$ correct to four decimal places if $y(x)$ satisfies $y' = x - y^2$ and $y(0) = 1$									
5B.	Determine all the eigen values and any one eigen vector of the matrix $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$								3 Marks	
5C.	Prove that the orthogonal set of non zero vectors is linearly independent.									