Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

FIRST SEMESTER B.TECH. (COMMON TO ALL BRANCHES)

END SEMESTER EXAMINATIONS, November, 2017

SUBJECT: ENGINEERING MATHEMATICS-I [MAT 1101]

REVISED CREDIT SYSTEM

15/11/2017

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

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

1A.	Solve by Gauss Seidel method. Carry out 4 iterations correct up to 4 decimal places $10x - y + 2z = 6$ $-x + 11y - z + 3w = 25$ $2x - y + 10z - w = -11$ $3y - z + 8w = 15$	**4**
1B.	Construct an orthonormal basis from the following set of vectors (0,1,0), (2,3,0) and (0,2,4) for E^3.	**3**
1C.	Find a root of the equation $xe^{-x} = \cos x$ using method of false position correct to four decimal places [1, 2] carry out 3 iterations.	**3**
2A.	Find the real root of f(x)=0, if f(– 1)=2, f(2)= – 2, f(5)=4 and f(7)=8 by Lagrange's method.	**4**
2B.	Find by Taylor's series method of order four the value of y at x = 0.3 to four decimal places from $\frac{dy}{dx} = 2y + 3xe^x$, y(0)=0.	**3**
2C.	Solve $xy' = y + x^3 \sin x$ with $y(\pi) = 0$.	**3**

3A.	Find the eigen values and corresponding eigen vectors of A= $\begin{bmatrix} 3 & -1 & 2 \\ 3 & -1 & 6 \\ -2 & 2 & -2 \end{bmatrix}$	**4**
3B.	Solve $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} = xe^x$	**3**
3C.	The velocities of a car (running on a straight road) at intervals of 10 kms are given below. S in kms: 0, 10, 20, 30, 40, 50, 60 V in kms/hr: 47, 58, 64, 65, 61, 52, 38 Apply Simpson's 3/8th rule to find the time taken by the car to cover 60kms.	**3**
4A.	(i) Prove that a maximal linear independent set of vectors forms a basis. (ii) "V is a vector space over a field F." What do you mean by a field here?	**4**
4B.	Solve $(D^2 - 2D + 1)y = e^x \log x$ by variation of parameters.	**3**
4C.	Evaluate $\frac{d^2y}{dx^2}$ at x=1.5 from the following table. x: 1, 1.2, 1.4, 1.6 y: 47, 58, 64, 65	**3**
5A.	Solve x + y + z = 0, x– 2y + 2z = 4, x + 2y– z=2 by Gauss Jordan method.	**4**
5B.	Using Runge-Kutta method of fourth order, solve for y at x = 1.5 given that $\frac{dy}{dx} = \frac{2x-y^2}{x^2+y}$ with $x_0 = 1$, $y_0 = 0$ and h = 0.5 .	**3**
5C.	Solve $x^2\frac{d^2y}{dx^2} - x\frac{dy}{dx} + 4y = \cos(\log x) + x\sin(\log x)$	**3**

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