Code No: 51008 **R09**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD
B.Tech I Year Examinations, December-2014/January-2015
MATHEMATICAL METHODS
(Common to EEE, ECE, CSE, EIE, BME, IT, ETM, ICE)

Time: 3 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks

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1.a) Test the consistency of the system of equations $3x+3y+2z=1; x+2y=4; 10y+3z=-2; 2x-3y-z=5$ and solve them if they are consistent by LU decomposition method.

b) Find the inverse of the matrix $\begin{bmatrix} 6 & -2 & -2 \\ 10 & -3 & 1 \\ -10 & 5 & 1 \end{bmatrix}$ by elementary transformations.

2.a) Find the Eigen values and Eigen vectors of $A=\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$.

b) Verify Cayley-Hamilton Theorem and find A^{-1}, where $A=\begin{bmatrix} 7 & 2 & -2 \\ -6 & -1 & 2 \\ 6 & 2 & -1 \end{bmatrix}$.

3.a) Reduce the quadratic form $3x^2+5y^2+3z^2-2yz+2zx-2xy$ to the canonical form and specify the matrix of transformation.

b) Define Hermitian, Skew-Hermitian, Unitary matrices and write some properties of Eigen values and Eigen vectors of these matrices.

4.a) Prove that $\left(E^{\frac{1}{2}}+E^{-\frac{1}{2}}\right)(1+\Delta)^{\frac{1}{2}}=2+\Delta$.

b) Using the Lagrange's formula, find the interpolating polynomial that approximates to the function described by the following table. Hence find f (0.5)

X	0	1	2	3	4
F(x)	3	6	11	18	27

c) Solve for a positive root of the equation $x^4-x-10=0$ using Newton-Raphson method.

5.a) Obtain the line of the form y=a+bx for the following data.

x	1	3	4	2	5	8	9	10	13	15
y	8	6	10	8	12	16	16	10	32	32

b) Evaluate $\int_0^1 \frac{x}{1+x^2}dx$ using Simpson's 1/3rd rule. Hence find the approximate value of Log2.

6.a) Given that $\frac{dy}{dx} = 2e^x - y$, y(0) =1 find the value of y (0.1), y (0.2) using Runge Kutta method.

b) Use Modified Euler's method to find y(0.2) for the given IVP $\frac{dy}{dx} = y + e^x, y(0) = 0$.

7.a) Find the half range cosine series for the function $f(x) = \begin{cases} x^2, & 0 \le x < 1 \\ 1, & 1 \le x \le 2 \end{cases}$

b) Find the Fourier series of $f(x) = x - x^2$ defined in the interval $(-\pi, \pi)$.

8.a) Form the partial differential equation by eliminating the arbitrary function $f(x^2 + y^2 + z^2, ax + by + cz) = 0$.

b) Solve the partial differential equation $x(y-z)p + y(z-x)q = z(x-y)$.

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OR