Code: 13A54301 **R13**

B.Tech II Year I Semester (R13) Supplementary Examinations June 2016

MATHEMATICS – II

(Common to CE and ME)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) Given matrix A = $\begin{bmatrix} a & h & g \\ h & b & f \\ g & f & c \end{bmatrix}$, check whether it is symmetric or not.

(b) Define a normal form of matrix.

(c) Explain Lagrange's interpolation formula for unequal intervals.

(d) State Regula-Falsi method for equal intervals.

(e) Compute y at x = 0.25, $y' = 2xy$, y(0) = 1 by Euler's method.

(f) Is $f(x) = coshax, -\pi < x < \pi$ even?

(g) Explain half range cosine series in the interval (0, l).

(h) Write the formula of Fourier sine Transform.

(i) Derive a partial differential equation by eliminating the arbitrary function f from the relation: f($x^2 + y^2$, $x^2 - z^2$) = 0.

(j) Give the One Dimensional wave equation for a stretched string.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 Find the characteristic equation of the matrix A = $\begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$ hence find A^{-1} and the matrix represented by $A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 - 2A + I$.

OR

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

UNIT – II

4 Derive formula to find the cube root of 'N' using Newton's formula and also find the cube root of 15.

OR

5 Apply Newton's forward interpolation formula to compute the value of $\sqrt{5.5}$ up to three decimal places. Given that $\sqrt{5} = 2.236$, $\sqrt{6} = 2.449$, $\sqrt{7} = 2.646$, and $\sqrt{8} = 2.828$.

UNIT – III

6 Compute the integral $\int_0^6 \frac{dx}{1+x^2}$, using (i) Trapezoidal rule. (ii) Simpson's 1/3rd rule.

OR

7 Given $y' = y + e^x$, y(0) = 0 using modified Euler's method, find y(0.2) and y(0.4).

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UNIT – IV

8 Find the Fourier sine series for $f(x) = 2x - x^2$ in 0 < x < 3.

OR

9 Find the Fourier transform of $f(x) = \begin{cases} 1-x^2 & for \quad |x| \le 1 \\ 0 & for \quad |x| > 1 \end{cases}$ and hence

$$\int_0^\infty \frac{x\cos x - \sin x}{x^3}\cos\left(\frac{x}{2}\right)dx \text{ and } \int_0^\infty \frac{x\cos x - \sin x}{x^3}dx$$

UNIT – V

10 Form the P.D.E of the following by eliminating the arbitrary functions:

(a) $Z = y^2 + 2f\left(\frac{1}{x} + \log y\right)$.

(b) $xyz = f(x^2 + y^2 + z^2)$.

OR

11 A string is stretched and fastened to two points l apart. Motion is started by displacing the string into the form $y = k(lx - x^2)$ from which it is released at time t = 0. Find the displacement of a string at a distance of x from one end at a time t.

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