Code: 13A54301 **R13**

B.Tech II Year I semester (R13) Supplementary June 2015 Examinations

MATHEMATICS - II

(Common to CE & ME)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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

(a) What is the Skew Hermitian matrix with proper example?

(b) Find the rank of $\begin{bmatrix}0 & 3 & 1\\2 & 3 & 5\\2 & 1 & 2\end{bmatrix}$.

(c) State formula for regular Falsi method.

(d) Find $f(x_1)$ an approximate value of the equation $x^3+x-1=0$ near x=1, using the method of regular falsi.

(e) Using Taylors series method, solve equation $\frac{dy}{dx} = x + y, y(0) = 1.$

(f) What is the formula for half range sine series?

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

(h) Find the Eigen values of $A = \begin{pmatrix}8 & 9\\9 & 5\end{pmatrix}$.

(i) Form a PDE by eliminating the constants h and k from $(x-h)^2 + (y-k)^2 + z^2 = c^2$.

(j) What is the formula for RK fourth order formula?

PART – B

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

UNIT - I

2 If $A = \begin{bmatrix}2 & 1 & 1\\0 & 1 & 0\\1 & 1 & 2\end{bmatrix}$ then find the matrix represented by

$A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 - 2A + I$ and also find A^{-1}.

OR

3 Reduce the quadratic form to 2xy+2xz-2yz to a canonical form and also find its nature of the matrix.

UNIT - II

4 Find a real root of the equation $x \log_{10} x = 1.2$ by Newton Raphson method correct to five decimal places.

OR

5 From the following, estimate the number of students who obtained marks between 40 and 45:

Marks	30-40	40-50	50-60	60-70	70-80
No. of students	31	42	51	35	31

Using Newton's forward interpolation formula.

UNIT - III

6 Find the value of y for x = 0.1 by Picard's method, given that $\frac{dy}{dx} = \frac{y-x}{y+x}, y(0) = 1.$

OR

7 Evaluate $\int_0^{\pi} \sin x \, dx$ by dividing the range into 6 equal parts by using: (a) Trapezoidal rule and (b) Simpson's $\frac{1}{3}$ rule.

UNIT - IV

8 Expand the function f(x) = x sin x, as a Fourier series in the interval $-\pi \le x \le \pi$. Hence deduce that $\frac{1}{1.3} - \frac{1}{3.5} + \frac{1}{5.7} - \frac{1}{7.9} + \ldots\ldots\ldots = \frac{\pi-2}{4}$.

OR

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

and use it to evaluate $\int_0^{\infty} \left(\frac{x\cos x - \sin x}{x^3}\right) \cos\frac{x}{2} dx$.

UNIT - IV

10 Using the method of separation of variables, solve $\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial t} + u \; where \; u(x,0) = 6e^{-3x}$.

OR

11 Determine the solution of one dimensional heat equation $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial t^2}$ subject to the boundary conditions u(0, t) = 0, u(1, t) = 0 (t>0) and initial conditions u(x, 0) = x, 1 being the length of the bar.

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