Code: 13A54102

R13

B.Tech I Year (R13) Supplementary Examinations December 2019

MATHEMATICS – II

(Common to EEE, ECE, EIE, CSE & IT)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

*****

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

(a) Find the Eigen values and the corresponding of $\begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$.

(b) Show that $A = \begin{bmatrix} 2 & 3+4i \\ 3-4i & 2 \end{bmatrix}$ is Hermitian.

(c) Define algebraic and transcendental equations with example each.

(d) The value of $\int_1^2 \frac{1}{x}dx$ by Simpson's 1/3 rule (taking n = 4) is________.

(e) If $\frac{dy}{dx} = -y,\ y(0) = 1,\ h = 0.01$ then by Euler's method the value of y_1 is _________.

(f) Write the Fourier series of f(x) in [C, C+2L].

(g) Find the Fourier cosine transform f(x) = e^{-ax}.

(h) Define convolution theorem.

(i) Write the two dimensional Laplace equation.

(j) Form a partial differential equation by eliminating the arbitrary constants a and b from the equation: z = ax + by.

PART – B

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

UNIT – I

2 Reduce the matrix $A = \begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$ into its normal form and hence find its rank.

OR

3 Reduce the quadratic form $3x^2 + 3y^2 + 3z^2 + 2xy + 2xz - 2yz$ into canonical form using orthogonal transformation and find its rank, index and signature.

UNIT – II

4 (a) Using Newton-Raphson method compute $\sqrt{41}$ correct to four decimal places.

(b) Find the root of an equation $2x - \log x = 6$ by Regula-falsi method.

OR

5 (a) Evaluate $\int_0^1 x^3 dx$ with five sub-intervals by Trapezoidal rule.

(b) Evaluate $\int_1^2 \frac{e^x}{x}dx$ using Simpson's $\frac{1}{3}$ rule for n = 4.

UNIT – III

6 Using Euler's method, solve for y at $x = 0.1$ from $\frac{dy}{dx} = x + y + xy,\ \ y(0) = 1$ taking step size $h = 0.025$.

OR

7 Find the Half range cosine series of $f(x) = x(1-x)\ in\ [0, 2]$.

Contd. in page 2

UNIT – IV

8 Find the Fourier series for $f(x)=\begin{cases}-\pi, & -\pi<x<0\\ x, & 0<x<\pi\\ \frac{-\pi}{2}, & x=0\end{cases}$

Hence deduce that $\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+\ldots=\frac{\pi^2}{8}$.

OR

9 (a) Find $Z(n\sin n\theta)$.

(b) Find $Z^{-1}\left(\frac{z^3}{(z-3)(z-2)^2}\right), |z|>3$.

UNIT – V

10 Form the PDE by eliminating arbitrary function $f\left(x^2+y^2+z^2, xyz\right)=0$.

OR

11 A bar of length l with insulated sides is initially 0°C temperature throughout the end $x=0$ is kept at 0°C for all time and heat is suddenly applied such that $\frac{\partial u}{\partial x}=10$ at $x=l$ for all time. Find the temperature function $u(x,t)$.

*****