R09

Code No: 51008

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech I Year Examinations, October/November - 2020
MATHEMATICAL METHODS
(Common to EEE, ECE, CSE, EIE, IT)

Time: 2 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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1.a) Solve the following Tridiagonal system

$x - y = 0,$
$-2x + 4y - 2z = -1,$
$-y + 2z = 1.5.$

b) Find the rank of $A = \begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$ [10+5]

2. Is $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$ diagonalizable, If it is diagonalizable then find A^4. [15]

3. Find the orthogonal transform which transform the quadratic form $x^2 + 3y^2 + 3z^2 - 2yz$ to the canonical form. [15]

4.a) Determine the root of $xe^x - 2 = 0$ by method of false position method.

b) Define interpolation, and Find the interpolate polynomial from the following data:

x	0	1	2	3	4
y	3	6	11	18	27

[7+8]

5.a) A rocket is launched from the ground. Its acceleration is measured every 5 seconds in the table below. Find the velocity and the position of the rocket at $t = 40$ seconds, using Simpson's rule.

t	0	5	10	15	20	25	30	35	40
a(t)	40.0	45.25	48.50	51.25	54.35	59.48	61.5	64.3	68.7

b) Find the best fit of the curve $y = a(b^x)$ to the following data: [8+7]

x	2	6	5	8
y	1	5	7	9

6. Using Runge Kutta method of fourth order, find y(0.1), y(0.2) and y(0.2) from $\frac{dy}{dx} = x - y,\ y(0) = 1.$ [15]

7. Find the Fourier series of $f(x)=\begin{cases} 0 & , -\pi \le x \le 0 \\ \sin x, & 0 \le x \le \pi \end{cases}$; Hence show that $\frac{1}{1.3}+\frac{1}{3.5}+\frac{1}{5.7}+\ldots\ldots\ldots = \frac{1}{4}(\pi - 2).$ [15]

8.a) Solve the partial differential equation $(mz - ny)p + (nx - lz)q = ly - mx$ where l, m, n are constants.

b) Solve $(p^2 + q^2)y = qz$ [7+8]

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