R09

Code No: 56083

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, February/March - 2022
NUMERICAL METHODS
(Automobile Engineering)

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

Answer any five questions
All questions carry equal marks
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1.a) Find a real root of the equation of $x^3 + x^2 - 1 = 0$ by iteration method.
b) Find a root of $x\tan x + 1 = 0$ by Newton Raphson method. [8+7]

2. Solve the system of equations using Gauss Seidal method:
x + 5y + 2z = 7
7x - y + z = 2
x + 2y + 5z = 9 [15]

3.a) Find y(32) if y(10)=35.3, y(15) = 32, y (20) = 29.2, y (25) = 26.1, y (30) = 23.2, y(35) = 20.5 using Newton's forward formula.
b) Find y(1.6) if y(1.2) = 1.36, y(2.0) = 0.58 and y(2.5) = 0.34, y(3.0)= 0.20 using Lagranges formula. [7+8]

4. Fit a parabola $y = a + bx + cx^2$ to the following data: [15]

x	1	2	3	4	5	6	7
y	2.3	5.2	9.7	16.5	29.4	35.5	54.4

5. Find $\int_0^1 \frac{dx}{1+x^2}$ using 10 intervals using a) simpson $\frac{1}{3}rd$'s rule b) simpson $\frac{3}{8}th$'s rule. [15]

6. Find y(0.1) and y(0.2) using Taylor's series method given that $y' = y^2 + x$ and y(0)=1, h = 0.1. [15]

7. Find the values of y(0.25), y(0.5) and y(0.75) by finite difference method, given that $y'' - 4y = 8$, y(0) = 0, y(1) = 0, Compare the results with the exact values and find the percentage error. [15]

8. Find the numerical solution of $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ for h= 0.2, $0 \le x \le 1$, $t \ge 0$, with the boundary conditions. [15]

u(0, t) = u(1, t) = 0, $u(x,0) = \begin{cases} 2x, 0 \le x \le \frac{1}{2} \\ 2(1-x), \frac{1}{2} \le x \le 1 \end{cases}$

at i= 1, 2, 3, 4, 5 and
j = 1, 2, 3, 4, 5

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