

R09

Code No: 09A40306

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

B.Tech II Year II Semester Examinations, November/December-2013

NUMERICAL METHODS

(Common to ME, MCT, MIE)

Time: 3 hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

- 1.a) Find a real root of the equation $x^3 - 4x - 9 = 0$ using Regula falsi method.
b) Find a root of the equation $f(x) = x^3 - 5x + 3 = 0$ using Newton Raphson method. [15]

2. Solve the system of equations using Gauss Seidal method
 $9x - y + 2z = 10$
 $3x + 7y - 2z = 12$
 $x + 2y + 6z = 8$ [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 interpolation formula
b) Fit a natural cubic spline to the following data. Hence determine $y(.5), y'(4)$ and $y(1.5)$ [15]

x	0	1	2
y	4	1	2

- 4.a) Derive normal equations to fit the curve $y = a + bx$ from the given data points (x_i, y_i) ($i=1,2,3,\dots,n$)
b) Find the curve $y = ae^{bx}$ for the following data [15]

x	1	2	3	4	5	6
y	1.6	4.5	13.8	40.2	1.25	300

- 5.a) Given the values of $\sin x$, find $\cos 1.4$

x	1.0	1.2	1.4	1.6	1.8
Sin x	0.8415	0.932	0.9854	0.9996	0.9738

- b) Evaluate $\int_0^1 e^{-x^2} dx$ by dividing the range of integration into 4 equal parts using
(i) Trapezoidal rule, (ii) Simpson's $\frac{1}{3}$ rd rule. [15]

6. Use Runge Kutta fourth order method to find y at $x= 0.1, 0.2$ and 0.3 given that $\frac{dy}{dx} = x + y ; y(0) = 1$. [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. [15]
8. Solve $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ with the boundary conditions $u(0, t) = u(1, t) = 0, u(x, 0) = x(1 - x)$, tabulate the values for $h= 0.25, i= 1, 2, 3, 4$ and $j= 1, 2, 3$ and 4 . [15]

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