

Code: 9A14501

R09

B.Tech III Year I Semester (R09) Supplementary Examinations June 2017

NUMERICAL METHODS

(Mechatronics)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Find the root of the equation $x^3 - 2x - 5 = 0$ which lies near $x = 2$.
(b) Find a real root of the equation $x = e^{-x}$, using the Newton-Raphson method.
- 2 (a) Solve the system of equations by Jacobi's iteration method.
 $14x_1 - 3x_2 = 8$; $x_1 + 5x_2 = 11$
(b) Use Gauss-Seidal iteration method to solve the system.
 $10x + y + z = 12$
 $2x + 10y + z = 13$
 $2x + 2y + 10z = 14$
- 3 (a) Find the Newton's forward difference interpolating polynomial for the data

x	0	1	2	3
f(x)	1	3	7	13

(b) Given $x = 1, 2, 3, 4$ and $f(x) = 1, 2, 9, 28$ respectively find $f(3.5)$ using Lagrange method.
- 4 (a) Fit a polynomial of second degree to the data points given in the following table:

x	0	1.0	2.0
y	1.0	6.0	17.0

(b) Fit the exponential curve $y = ae^{bx}$ to the following data.

x:	2	4	6	8
Y:	25	38	56	84
- 5 Evaluate $\int_0^1 \sqrt{1+x^3} dx$ taking $h = 0.1$ using
(a) Simson's 1/3 rule.
(b) Trapezoidal rule.
- 6 Obtain the values of y at $x = 0.1, 0.2$ using Runge-Kutta method of:
(i) Second order. (ii) Third order. (iii) Fourth order.

- 7 Find the Eigen values and the corresponding Eigen vectors of $A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$.

- 8 Find the values of $u(x, y)$ satisfying the Laplace's equation $\nabla^2 u = 0$ at the pivotal points of a square region with boundary values as shown in the following figure.

