

R09
Code: 9A14501

B.Tech III Year I Semester (R09) Supplementary Examinations December 2015

NUMERICAL METHODS

(Mechatronics)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Find a real root of $x^3 - 5x + 3 = 0$ using bisection method.
(b) Find the positive root of $x^4 - x - 10 = 0$ by iteration method.

- 2 (a) Solve the equation:
 $3x + y + 2z = 3$
 $2x - 3y - z = 3$
 $x + 2y + z = 4$. Using Gauss-Elimination method.
 (b) Show that the system of equations:
 $2x + y = 2$; $2x + 1.01y = 2.01$ are ill conditioned.

- 3 (a) For the given values:

x	0	2	3	6
f(x)	-4	2	14	58

 Using Lagrange's formula for interpolation, find the value of $f(4)$.

- (b) Fit the cubic spline for the data:

x	0	1	2	3
f(x)	1	2	9	28

- 4 (a) Fit a straight line to the data given below:

x	1	3	5	7	9
f(x)	1.5	2.8	4.0	4.7	6.0

- (b) Find a curve $y = ae^{bx}$ to the data:

x:	0	2	4
y:	5.1	10	31.1

- 5 Evaluate $\int_0^1 \frac{1}{1+x} dx$.

(i) BY Trapezoidal rule.

 (ii) Simpson's $\frac{3}{8}$ rule.

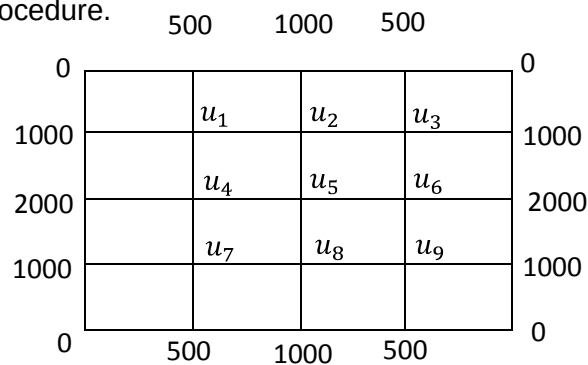
- 6 Employ Taylor's method to obtain approximate value of $y(1.1)$ and $y(1.3)$ for the differential equation $y' = xy^{1/3}$, $y(1) = 1$. Compare numerical solution obtained with exact solution.

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- 7 (a) Solve the boundary value problem: $\frac{d^2y}{dx^2} = x + y$, $y(0) = y(1) = 0$.
- (b) Apply the power method to find the dominant Eigen value and Eigen vector of the matrix $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$.
- 8 Solve the $u_{xx} + u_{yy} = 0$ for the following square mesh with boundary values as shown below, using Leibman's iteration procedure.



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