

JAYA GROUP OF INSTITUTIONS
4th/6th Semester-B.E./B.Tech
MODEL EXAMINATION -I.

Sub.Title : NUMERICAL METHODS
 Sub. Code : MA 6459
 Duration : 3 Hrs.

Date : 29.1.2015
 Branch : EEE
 Max. Marks : 100

PART-A(10x2=20 Marks)

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Answer all questions.

1. What is the condition for applying the fixed point iteration method to find the real root of the equation $x=f(x)$.
2. Derive the N.R formula to find \sqrt{a} .
3. State the order of convergence and convergence condition for Newton-Raphson method.
4. Compare Gauss elimination method and Gauss-Jordan method.
5. Compare Gauss-Jacobi and Gauss-Seidel methods.
6. What is the Lagrange's formula to find y , if three sets of values (x_0, y_0) and (x_2, y_2) are given.
7. What is a cubic spline?
8. Write the divided difference formula.
9. Derive Newton's backward difference formula by using operator method.
10. When will we use Newton's forward interpolation formula?

PART-B (5x16=80)

- 11.a. i. Find the real root if the equation $x^3 + x^2 - 100 = 0$ using fixed point iteration method.
 ii. Find the real positive root of $3x - \cos x - 1 = 0$ by Newton's method.

OR

- b.i. Solve the system of equations by Gauss elimination method

$$10x - 2y + 3z = 23$$

$$2x + 10y - 5z = -33$$

$$3x - 4y + 10z = 41$$

- b.ii. Find the dominant Eigen values and Eigenvectors of the Matrix $\begin{pmatrix} 1 & 6 & 1 \\ 1 & 2 & 0 \\ 0 & 0 & 3 \end{pmatrix}$ (8)

- 12.a.i. Solve the following equations by Gauss-Seidel method
 $4x + 2y + z = 14, x + 5y - z = 10, x + y + 8z = 20$.

- ii. Using Gauss-Jordan method, find the inverse of the matrix $\begin{pmatrix} 2 & 2 & 3 \\ 2 & 1 & 1 \\ 1 & 3 & 5 \end{pmatrix}$

OR

- b.i. Solve the following system of equations by gauss-Jacobi method
 $28x + 4y - z = 32; x + 3y + 10z = 24; 2x + 17y + 4z = 35$.
- ii. Find the value of $\sqrt{12}$ using Newton Raphson method.

13. a.i. Solve by Gauss Jordan method $x + 3y + 3z = 16, x + 4y + 3z = 18, x + 3y + 4z = 19$.

ii. Find the dominant Eigen values and Eigenvectors of the Matrix $\begin{pmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{pmatrix}$

OR

b.i. Using Lagrange's interpolation formula, find the value corresponding to $x = 10$ from the following table

x	5	6	9	11
y	12	13	14	16

ii. Using Newton's divided difference interpolation, find the polynomial of the given data:

x	-1	0	1	3
y	2	1	0	-1

14. a. Find the cubic spline for the data given that $y_0'' = y_2'' = 0$.

x	1	2	3
y	-6	-1	16

OR

b. From the following data find $\theta = 43$ and $\theta = 84$

X	40	50	60	70	80	90
θ	181	204	226	250	276	304

15. a.i. Find the cubic polynomial from the following table using Newton's divided difference formula and hence find $f(4)$

X	0	1	2	5
$Y=f(x)$	2	3	12	147

ii. Find the value of x when $y=85$ using Lagrange's formula from the following table.

X	2	5	8	14
Y	94.8	87.9	81.3	68.7

OR

b. The following values of x and y are given

X	1	2	3	4
Y	1	2	5	11

Find the cubic spline and evaluate $y(1.5)$