JAYA GROUP OF INSTITUTIONS- THIRUNINRAVUR

4 TH SEM – B.E

INTERNAL ASSESSMENT – 1 (MODEL EXAMINATION- I)

Subject Name	: Numerical Methods	Date	: 27-1-2015
Subject Code	: MA6459	Branch	: EEE (A&B)
Duration	:180 Minutes	Max Marks	: 100

Part A (10X2=20) Answer all the questions

1. State the order of convergence and convergence condition for Newton's Raphson method.
2. What is the condition for applying the fixed point iteration method to find the real root of the equation $x = f(x)$
3. For solving a linear system, compare Gaussian elimination method and Gauss Jordon method
4. Solve the system of equations $x-2y = 0$, $2x+y = 5$ by Gaussian elimination method.
5. Write sufficient condition for Gauss-Seidel method to converge.
6. State Lagrange's interpolation formula.
7. Find the divided difference of $f(x) = x^3 + x + 2$ for arguments 1,3,6,11.
8. Define a cubic spine $s(x)$ which is commonly used for interpolation.
9. State Newton's backward difference interpolation formula.
10. What is the error in Newton's forward interpolation formula.

Part B (5X16=80) Answer the question As per the choice

11. (a)Find a root of $x\log_{10}^{x} - 1.2 = 0$ by Newton Raphson method correct the three decimal places. (8M)

    (b) Solve $e^x - 3x = 0$ by the method of fixed point iteration. (8M)

    Or

    (c) Solve the system of equation by(i)Gauss elimination method (ii) GaussJordonmethod

    $10x+y+z = 12$, $2x+10y+z = 13$, $x+y+5z = 7$ (16M)

12. (a) Solve the following system of equations by Gauss Jacobi method. (8M)

    $27x+6y-z = 85$, $x+y+54z = 110$, $6x+15y+2z = 72$

(b) Find the dominant eigen value and the corresponding eigen vector of (8M)

$$A=\begin{bmatrix} 25 & 1 & 2 \\ 1 & 3 & 0 \\ 2 & 0 & -4 \end{bmatrix}.$$

Or

(c) Using Gauss-Sidel method, solve the following system start with $x = 1, y = -2, z = 3$

$x+3y+52z = 173.61$, $x-27y+2z = 71.31$, $41x-2y+3z = 65.46$ (8M)

(d) Using Gauss Jordon, Find the inverse of the matrix $\begin{bmatrix} 2 & 2 & 3 \\ 2 & 1 & 1 \\ 1 & 3 & 5 \end{bmatrix}$ (8M)

13 (a) Find the iterative formula for find the value of $\frac{1}{N}$ where N is a real number, using Newton-Raphson, method. Hence evaluate $\frac{1}{26}$ to correct to 4 decimal places. (8M)

(b) Find the dominant eigen value and the corresponding eigen vector of (8M)

$$A=\begin{bmatrix} 1 & 6 & 1 \\ 1 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$$ .Find also the least eigen value alsoeigen vector

Or

(c) Using Lagrange's formula fit a polynominal to the data

x	-1	1	2
y	7	5	5

(8M)

(d) Using Newton's difference formula, find u(3) given u(1) = -26, u(2) = 12 , u(4) = 256, u(6) = 844. (8M)

14. (a) Obtain the cubic spline approximation for the function y = f(x) from the following data, $y_0'' = y_3'' = 0$

x	-1	0	1	2
y	-1	1	3	25

(8M)

(b) Using the Lagrange's interpolation formula find y(10) given that y(15)=12, y(6)= 13, y(9) = 14, y(11)=16 (8M)

Or

(c) From the data given below find the number of students whose weight is between 60 to 70

Weight in lbs	0-40	40-60	60-80	80-100	100-120
No of students	250	120	100	70	50

(8M)

(d) Find *f(x)* as a polynomial in *x* for the following data by Newton's divided difference formula. (8M)

x ;	-4	-1	0	2	5
f(x)	1245	33	5	9	1335

15 (a) From the following table

x	1	2	3
y	-8	-1	18

Compute y(1.5) using cubic spline (8M)

(b) Find the age corresponding to the annuity value 13.6 given the table

Age *(x)*	30	35	40	45	50
Annuity Value	15.9	14.9	14.1	13.3	12.5

Or

(c) From the following table find θ at $x = 43$ and $x = 84$ (8M)

x :	40	50	60	70	80	90
θ :	184	204	226	250	276	304

(d) Find *f(8)* by Newton's divided difference formulae for the data : (8M)

x :	4	5	7	10	11	13
$f(x)$:	48	100	294	900	1210	2028