JAYA GROUP OF INSTITUTIONS-THIRUNINRUVUR-602024

IV-SEMESTER-B.E/B.Tech

Model Examination-III

Sub Title : Numerical Methods	**Date** : 10.04.15
Sub Code :MA6459	**Branch** : Civil
Duration : 3 hrs	**Max.Marks**:100

PART-A (Answer all the questions) **(10*2=20)**

1. Find the iterative formula for $\sqrt{a}$.
2. State the principal used in Gauss-Jordan method.
3. Find the divided difference of $f(x)=x^3+x+2$ for the arguments 1,3,6,11
4. What is a cubic spline?
5. State three point Gaussian quadrature formula.
6. What is the order of error in trapezoidal formula?
7. State modified Euler's algorithm to solve $y'=f(x,y)$, $y(x_0)=y_0$ at $x=x_0+h$.
8. Write down Adam's Bashforth predictor and corrector formulae.
9. Write the diagonal five point formula for solving the two dimensional laplacian equation $\Delta^2u=0$.
10. Using finite difference solve $y''-y=0$ given $y(0)=0,y(1)=1,n=2$

PART-B (Answer as per choice) **(5*16=80)**

11.a(i) Using Newton's Raphson method,find the root of $x\log_{10}x = 1.2$. (8)

(ii) Apply gauss seidel method to solve the system of equations
$20x+y-2z=17, 3x+20y-z=-18, 2x-3y+20z=25$. (8)

(OR)

b.(i) Using guass-jordan method,find the inverse of the matrix $\begin{bmatrix}0 & 1 & 2\\1 & 2 & 3\\3 & 1 & 1\end{bmatrix}$ (8)

(ii) Find the dominant eigen value of A= $\begin{bmatrix}1 & 6 & 1\\1 & 2 & 0\\0 & 0 & 3\end{bmatrix}$ and corresponding eigen vector. (8)

12.a(i)Given the values,find f(27) by using lagrange's interpolation (8)

x	14	17	31	35
f(x)	68.7	64.0	44.0	39.1

(ii)Obtain the cubic spline approximation for the function y=f(x),from the following data,given that $y_0''=y_3''=0$ (8)

X	-1	0	1	2
Y	-1	1	3	35

(OR)

12.b(i) Using Newton's divided difference formula,find u(3) given
$u(1)=-26, u(20)=12, u(4)=256, u(6)=844$. (8)

(ii)The population of a town is as follows,find y(1976) (8)

year	1941	1951	1961	1971	1981	1991
population	20	24	29	36	46	51

13.a(i) Find the first,second and the third derivatives of f(x) at x=1.5 if (8)

X	1.5	2.0	2.5	3.0	3.5	4.0
f(x)	3.375	7.000	13.625	24.000	38.875	59.000

(ii) Evaluate $\int_0^2 \frac{x^2+2x+1}{1+(x+1)^4}$ dx by guassian three point formula. (8)

(OR)

b(i) The velocity v of particle at distance s from a point on its path is given (8)

S in metre	0	10	20	30	40	50	60
V m/sec	47	58	64	65	61	52	38

Estimate the time taken to travel 60 metres by using simpson's 1/3 rd rule .

(ii) Evaluate $\int_1^{1.4} \int_2^{2.4} \frac{1}{xy}$ dx dy,using trapezoidal and simpson's rule. (8)

14.a (i) Find y(1.2), by the modified Euler's method,If $\frac{dy}{dx} = (y-x^2)^3$, y(1)=0 taking h=0.2.(8)

(ii) If $\frac{dy}{dx} = x^3 + y$,y(o)=2.Find y(0.2),y(0.4) and y(0.6) by R-K method of fourth order. (8)

(OR)

b.(i)Using Milne's method find y(2) ,if y(x) is the solution of $\frac{dx}{dy} = \frac{1}{2}(x+y)$ given y(0)=2, y(0.5) =2.636,y(1) =3.595 and y(1.5)=4.968. (8)

(ii)Solve $y'=x-y^2$,y(0)=1 to find y(0.4) by Adam's method.Starting solutions required to be obtained using taylor's method using the value h=0.1. (8)

15.a(i)By iteration method,solve the elliptic equation $\Delta^2u=0$ over a suare region of side 4,satisfying the boundary conditions (8)

(i) u(0,y)=0 for $0\le y\le 4$

(ii)u(4,y)=12+y for $0\le y\le 4$

(iii)u(x,0)=3x for $0\le x\le 4$

(iv)$u(x,4)=x^2$ for $0\le x\le 4$

(OR)

b .(i)Using Crank-Nickolson's scheme, solve $16u_t = u_{xx}$, 0<x<1,t>0 subject to u(x,0)=0, u(0,t)=0 and u(1,t)=100t.Compute u for one time step,taking h=1/4. (8)

(ii)Solve $u_{tt}=u_{xx}$, 0<x<1,t>0 subject to $u(x,0)=100(x-x^2)$,$u_t(x,0)=0$,u(0,t)=u(1,t)=0,t>0 by finite difference method for one time step with h=0.25 (8)