B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2011

Fourth Semester

Electrical and Electronics Engineering

MA2264 – NUMERICAL METHODS

(Regulation 2008)

(Common to All)

Time : Three hours Maximum : 100 marks

Answer ALL Questions

PART A – (10 x 2 = 20 Marks)

1) Solve $e^x - 3x = 0$ by the method of iteration.
2) Using Newton's method, find the root between 0 and 1 of $x^3 = 6x - 4$.
3) State Lagrange's interpolation formula for unequal intervals.
4) Define cubic spline function.
5) State Simpson's one-third rule.
6) Write down two point Gaussian quadrature formula.
7) State Euler's method to solve $\frac{dy}{dx} = f(x, y)$ with $y(x_0) = y_0$.
8) State Adam's predictor-corrector formulae.
9) Classify the PDE $y(x_0) = y_0$.
10) State Standard Five Point formula with relevant diagram.

PART B – (5 x 16 = 80 marks)

11) a) i) Find an iterative formula to find the reciprocal of a given number N and hence find the value of $\frac{1}{19}$. (6)

ii) Apply Gauss-Jordan method to find the solution of the following system:

$$\begin{aligned} 10x + y + z &= 12 \\ 2x + 10y + z &= 13 \\ x + y + 5z &= 7 \end{aligned}$$ (10)

(Or)

www.hariganesh.com

b) i) Solve, by Gauss-Seidel method, the following system:

$$28x+4y-z=32$$
$$x+3y+10z=24 \qquad (10)$$
$$2x+17y+4z=35$$

ii) Find the largest eigenvalue of $\begin{pmatrix} 1 & 6 & 1 \\ 1 & 2 & 0 \\ 0 & 0 & 3 \end{pmatrix}$, by using Power method. (6)

12) a) The population of a town is as follows:

x Year:	1941	1951	1961	1971	1981	1991
y Population in thousands:	20	24	29	36	46	51

Estimate the population increase during the period 1946 to 1976.

(Or)

b) Determine $f(x)$ as a polynomial in x for the following data, using Newton's divided difference formulae. Also find $f(2)$.

x:	−4	−1	0	2	5
f(x)	1245	33	5	9	1335

13) a) Find the first two derivatives of $x^{1/3}$ at $x=50$ and $x=56$, for the given table:

$x:$	50	51	52	53	54	55	56
$y=x^{1/3}$	3.6840	3.7084	3.7325	3.7563	3.7798	3.8030	3.8259

(Or)

www.hariganesh.com

b) Evaluate $I = \int_0^6 \frac{1}{1+x} dx$ by using (i) direct integration (ii) Trapezoidal rule (iii)

Simpson's one-third rule (iv) Simpson's three-eighth rule.

14) a) Given $y'' + xy' + y = 0, \quad y(0) = 1, y'(0) = 0$. Find the value of $y(0.1)$ by using Runge-Kutta method of fourth order.

(Or)

b) Given that $\frac{dy}{dx} = \frac{1}{2}\left(1+x^2\right)y^2;\ y(0) = 1; y(0.1) = 1.06; y(0.2) = 1.12$ and $y(0.3) = 1.21$, evaluate $y(0.4)$ and $y(0.5)$ by Milne's predictor corrector method.

15) a) Using the finite difference method, compute $y(0.5)$, given $y'' - 64y + 10 = 0,$ $x \in (0,1), y(0) = y(1) = 0$, subdividing the interval into (i) 4 equal parts (ii) 2 equal parts.

(Or)

b) Solve $\nabla^2 u = 8x^2y^2$ for square mesh given $u = 0$ on the four boundaries dividing the square into 16 sub-squares of length 1 unit.

www.hariganesh.com