PVP 14

Code: EE3T1

II B.Tech - I Semester – Regular Examinations – December 2015

NUMERICAL METHODS AND DIFFERENTIAL EQUATIONS

(ELECTRICAL AND ELECTRONICS ENGINEERING)

Duration: 3 hours Max. Marks: 70

PART – A

Answer ***all*** the questions. All questions carry equal marks

11x 2 = 22 M

1. a) Show that $\nabla = \Delta E^{-1}$.

b) Solve $x = \sin x$ by bisection method.

c) Represent f(x) approximately by a polynomial of degree 2 using lagrange's interpolation, where f(1)= 3, f(2) = -5, f(-4) = 4.

d) Using trapezoidal rule evaluate $\int_4^8 \frac{dx}{x}$ using four equal sub-interval.

e) Find the square root of 17^2 using Newton Raphson Method upto 2 decimals.

f) Evaluate $\frac{dy}{dx}$ at x=0.1 where y(0.0) = 2, f(0.2) = 4, f(0.3) = 8 Newtons Forward interpolation method.

g) Form a Partial differential equation by eliminating the arbitrary constants z =ax + by + ab.

h) Solve 2p+3q=1.

i. Solve $p - q = \sin x + \sin y$

j. Solve $\frac{\delta u}{\delta x} = 4\frac{\delta u}{\delta y}$

k. Using Simpsons 1/3rd rule evaluate $\int_1^4 x^3 dx$ using six equal sub-intervals.

PART – B

Answer any ***THREE*** questions. All questions carry equal marks. 3 x 16 = 48 M

2. a) Evaluate i) $\Delta(\sin 2x \sin 4x)$, ii) $\Delta^n(a^{cx+d})$ 8 M

b) Use Lagrange's interpolation formula and find y when x=5 from the following data 8 M

X	1	2	3	4	7
Y	2	4	8	16	128

3. a) Find the first and second derivatives of the function tabulated below, at the point x=1.5 8 M

X	1.5	2.0	2.5	3.0	3.5	4.0
F(x)	3.375	7.0	13.625	24.0	38.875	59.0

b) Evaluate $\int_0^1 \frac{1}{1+x^2} dx$, using Boole's method, correct to 4 decimal places. Hence find an approximate value of π. 8 M

4. a) Employ Taylor's method to obtain approximate value of y at x=0.2 for the differential equation $\frac{dy}{dx} = 2y + 3e^x, y(0) = 0$. Compare the numerical solution obtained with exact solution. 8 M

b) Use Runge's method to find the approximate value of y when x=0.8 given that $\frac{dy}{dx} = \sqrt{x+y}, y(0.4) = 0.41$, Take $h = 0.2$ 8 M

5. a) Solve $(x^2 - yz)p + (y^2 - zx)q = z^2 - xy$. 8 M

b) Solve $z^2(p^2 + q^2) = x^2 + y^2$. 8 M

6. a) A string is tightly stretched and fastened to two points L apart. Motion is started by displacing the string in the form $y = a \sin\frac{\pi x}{l}$ from which it is released at time t=0. Show that the displacement of any point at a distance x from one end at time t is given by $y(x,t) = a \sin\frac{\pi x}{l} \, a \cos\frac{\pi ct}{l}$.

8 M

b) A rod of length L with insulated ends is initially at a uniform temperature u_0 . Its ends are suddenly cooled to 0^0C and are kept at that temperature. Find the temperature function U(x,t). 8 M.