PVP 14

Code: EE3T1

II B.Tech - I Semester–Regular/Supplementary Examinations – November 2017

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) Derive the formula to find square root of number by Newton Raphson method.

   b) If the interval of difference is unity, prove that

   $\Delta[x(x+1)(x+2)(x+3)] = 4\{(x+1)(x+2)(x+3)\}$

   c) Prove the relation among $\Delta, \nabla, \in$.

   d) Write expression for $\frac{dy}{dx}$ at $x = x_0$ using forward difference.

   e) Using trapezoidal rule evaluate $\int_0^1 f(x)dx$ given

x	0	0.5	1
$f(x)$	1	0.8	0.5

   f) Using Taylor's series method, solve the equation $\frac{dy}{dx} = x^2 + y^2$ for x = 0.4 given that y(0) = 0.

g) Given $\frac{dy}{dx} = x^2 - y,\ y(0) = 1\ find\ y(0.1)$ by using Euler's method.

h) Find the P.D.E of all spheres of radius 8 and having their centre in the yz –plane.

i) Solve $px - qy = z.$

j) Write the possible solutions of One dimensional wave equation.

k) Solve $4u_x + u_y = 3u$ *and* $u(0, y) = e^{-5y}$

PART – B

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

2. a) Apply Regula- falsi method to find the root of

$2x - \log_{10} x = 7$ 8 M

b) Find the population for the year 1925 using Interpolation formula 8 M

X	1891	1901	1911	1921	1931
Y	46	66	81	93	101

3. a) The table given below reveals the velocity 'v' of a body during the specified time t. Find the Acceleration at t = 1.1 8 M

t	1.0	1.1	1.2	1.3	1.4
v	43.1	47.7	52.1	56.4	60.8

b) When a train moving at 30m/sec, steam is shut off and brakes are applied. The speed of the train per second after t seconds is given by 8 M

Time(t)	0	5	10	15	20	25	30	35	40
Speed(v)	30	24	19.5	16	13.6	11.7	10	8.5	7

Using Simpson's rule, determine the distance moved by the train in 40seconds.

4. a) Given that $\frac{dy}{dx} = 1 + xy, y(0) = 1$ compute y(0.1) and y(0.2) using Picard's method. 8 M

b) Find y(0.1) and y(0.2) using Runge Kutta fourth order formula given that $\frac{dy}{dx} = x + x^2y$ and y(0) = 1. 8 M

5. a) Find the integral surface of $x(y^2+z)p - y(x^2+z)q = z(x^2-y^2)$, which contains the Straight line $x + y = 0, z = 1$. 8 M

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

6. a) Solve one dimensional Heat flow equation $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$ given that u(0,t) = 0, u(l,t)=0, t>0 and $u(x,0)=3\sin\left(\frac{\pi x}{l}\right), o < x < l$. 8 M

b) A tightly stretched string with fixed end points x=0 and x=l is initially in a position given by $y = y_0 \sin^3 \frac{\pi x}{l}$ If it is released from rest from this position, Calculate the displacement y(x,t). 8 M