PVP 14

Code: EE3T1

II B.Tech - I Semester–Regular/Supplementary Examinations
November 2018

NUMERICAL METHODS AND DIFFERENTIAL EQUATIONS
(ELECTRICAL & 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) Evaluate $\tan(\Delta tan^{-1}x)$ if $h = 1$.

b) Compute $f(2)$ such that $f(0) = 1,\ f(1) = 3,\ f(3) = 55$ using Lagrange's interpolation formula.

c) State Gauss forward formula for interpolation.

d) State Simpson's $\frac{1}{3}$ rule.

e) Using Trapezoidal rule evaluate $\int_0^1 x^3\,dx$.

f) Using Picard's method find a solution up to 2nd approximation of the equation $\frac{dy}{dx} = 2x - y$ and y(0)=1.

g) Find two approximations in the Euler method for solving $y(1.1)$ from $\frac{dy}{dx} = x(1+y),\ y(1) = 1$ with $h = 0.1$

h) Form the partial differential equation by eliminating the arbitrary constants from the equation $\frac{x^2}{a^2} + \frac{y^2}{b^2} = z$ where a, b are arbitrary constants.

i) Find the solution of the partial differential equation

$z = px + qy + \sqrt{1 + p^2 + q^2}$

j) State the One dimensional heat equation.

k) Write the possible solutions of Laplace equation.

PART – B

Answer any ***THREE*** questions. All questions carry equal marks.

3 x 16 = 48 M

2. a) Estimate a real root of the equation $x^3 - 5x + 3 = 0$ by Newton Raphson method. 8 M

b) Compute $y(15)$ using Newton's backward difference formula, from the following data. 8 M

x	8	10	12	14	16	18
y	12	29	62	154	489	915

3. a) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by using Simpson's $\frac{3}{8}$ rule. 8 M

(b) Find $y'(0)$ from the following table. 8 M

x	0	1	2	3	4	5
y	4	8	15	7	6	2

4. a) Using Taylor's method, solve $\frac{dy}{dx} = xy + 1$ with $y(0) = 1$ at $x = 0.1$ 8 M

b) Using Runge- Kutta method of fourth order, solve $\frac{dy}{dx} = 2x + y^2$ with $y(0) = 1$ at $x = 0.1, 0.2$. 8 M

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

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

6. a) Solve the partial differential equation $\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial t} + u,\ u(x,0) = 6e^{-3x}$ by the method of separation of variables. 8 M

b) A tightly stretched string of length l is fixed at the ends. It is initially in equilibrium and set vibrating by giving a velocity $v_0 \sin^3\left(\frac{\pi x}{l}\right)$ at each point. Find the displacement at any point. 8 M