PVP 14

Code: EE3T1

II B.Tech - I Semester–Regular/Supplementary Examinations
November 2016

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) Write the Newton-Raphson iteration formula for finding the real root of $f(x) = 0$.

b) Compute the Lagrange interpolation polynomial for $f(0) = 12,\ f(3) = 6,\ f(4) = 8$.

c) With the usual notations, show that $(1 + \Delta)(1 - \nabla) = 1$.

d) Expand *y(x)* into Taylor series about the point x_0.

e) Write fourth order Runge-Kutta iteration formula for solving initial value problem.

f) Write the Boole's formula for the numerical integration.

g) Let $y = f(x)$ and $p = \frac{x - x_0}{h}, h > 0$. Then show that $\frac{dy}{dx} = \frac{1}{h}\frac{dy}{dp}$

h) Estimate the Partial differential equation of family of all Cones with vertex at origin.

i) Write the Lagrange's linear partial differential equations and its auxiliary equations.

j) Write two dimensional Laplace equation.

k) Slove $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial x \partial y} - 6\frac{\partial^2 z}{\partial y^2} = 0$.

PART – B

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

3 x 16 = 48 M

2.

a) Compute the positive root of $x^4 - x = 10$ correct to three decimal places, using Newton-Raphson's method. 8 M

b) Given

$\sin 45^0 = 0.7071, \sin 50^0 = 0.7660, \sin 55^0 = 0.8192, \sin 60^0 = 0.8660,$

find $\sin 52^0$, using Newton's forward formula. 8 M

3.

a) Compute the value of cos(1.74) from the data

$\sin(1.7) = 0.9916, \sin(1.74) = 0.9857,$

$\sin(1.78) = 0.9781, \sin(1.82) = 0.9691, \sin(1.86) = 0.9584.$

8 M

b) Evaluate $\int_0^{\pi} \frac{\sin x}{x} dx$ by using Trapezoidal rule. 8 M

4.

a) Compute $y(0.1)$ for the initial value problem $\frac{dy}{dx} = \frac{y - x}{y + x}, y(0) = 1$ by using Picard's theorem. 8 M

b) Use Runge-Kutta method to evaluate *y(0.1)* and *y(0.2)* given that $y' = x + y, y(0) = 1$. 8 M

5.

a) Form the partial differential equation by eliminating the arbitrary function f from $z = f\left(\frac{xy}{z}\right)$. 8 M

b) Solve: $zp + yq = x$ 8 M

6.

a) Obtain the solution of the equation $\frac{\partial^2 y}{\partial t^2} - \frac{\partial^2 y}{\partial x^2} = 0$ using the method of separation of variables. 8 M

b) Solve $\frac{\partial^2 y}{\partial t^2} = c^2 \frac{\partial^2 y}{\partial x^2}$ satisfying $y(0,t) = 0$, $y(l, t) = 0$, $y(x,0) = 0$ and $\frac{\partial y}{\partial t}(x,0) = x$ for $0 \leq x \leq l$ and $t \geq 0$. 8 M