PVP 14

Code: EC3T1

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

ENGINEERING MATHEMATICS - III
(ELECTRONICS & COMMUNICATION ENGINEERING)

Duration: 3 hours Max. Marks: 70

PART – A

Answer ***all*** the questions. All questions carry equal marks
11x 2 = 22 M

1.

a) Prove that $(1+\Delta)(1-\nabla)=1$.
b) State Gauss backward formula for interpolation.
c) Explain Taylor series method for solving
$\frac{dy}{dx} = f(x, y),\ y(x_0) = y_0$.
d) Using Picard's method of successive approximation obtain a solution up to 2nd approximation of the equation $\frac{dy}{dx} = x + 2y$ and y(0)=1.
e) Write the Cauchy-Riemann equations.
f) Show that $u = e^x \cos y$ is harmonic.
g) Determine whether the function $2xy + i(x^2 - y^2)$ is analytic.
h) Evaluate $\oint_C \frac{e^{2z}}{z-1} dz$ where C is the circle $|z| = 2$.

i) Find the poles and their residues of $f(z) = \frac{1 - e^{z}}{z^{3}}$.

j) Define Bilinear transformation.

k) Evaluate by residue theorem $\oint_{C} \frac{z^{2} + 4}{z - 3} dz$ where C is the circle $|z| = 5$.

PART – B

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

3 x 16 = 48 M

2. a) Using Newton-Raphson's method find a real root of the equation $f(x) = 3x - \cos x - 1$ correct to four decimal places. 8 M

b) Using Lagrange's interpolation formula, find the value of *y* when *x*=30 from the table below. 8 M

x	20	22	29	32
y	24.37	49.28	162.86	240.50

3. a) Solve $\frac{dy}{dx} = x^{2} + y^{2}$, y(0) = 1 by Modified Euler's method to find y(0.2). 8 M

b) Using Runge- Kutta method of fourth order, solve

$\frac{dy}{dx} = x + y^2$ with $y(0) = 1$ at $x = 0.1,\ 0.2$. 8 M

4. a) If f(z) is a regular function, prove that

$$\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} \right) \left| f(z) \right|^2 = 4 \left| f'(z) \right|^2$$ 8 M

b) Find an analytic function whose real part is

$e^{-x}(x \sin y - y \cos y)$ 8 M

5. a) Evaluate $\oint_C \frac{\cos \pi z^2}{(z-1)(z-2)^3} dz$, where C is $|z| = 3$ by using Cauchy integral formula. 8 M

b) Expand $f(z) = \frac{z^2 - 1}{z^2 + 5z + 6}$ as Laurent's series about $z = 0$ in the regions $2 < |z| < 3$. 8 M

6. a) Using calculus of Residues evaluate $\int_0^{\pi} \frac{d\theta}{5 + 4 \cos \theta}$. 8 M

b) Find the bilinear transformation which maps the points $z = 1, i, -i$ onto the points $w = i, 0, -i$ 8 M