PVP 14

Code: EC3T1

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

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 $\mu^2 = 1 + \frac{\delta^2}{4}$

b) Prove that
$\Delta[x(x+1)(x+2)(x+3)] = 4(x+1)(x+2)(x+3)$
if h=1

c) Write the formulae for IV order Runge-Kutta method to solve first order differential equation.

d) Compute $y(0.25)$ by Euler's method, given $y' = 2xy$, $y(0) = 1$

e) Find k if the function $f(z) = e^x(cosky + isinky)$ is analytic.

f) Show that the function $u(x, y) = x^2 - y^2 - y$ is harmonic.

g) Write Cauchy-Riemann equations in polar form.

h) Prove that $\oint \frac{dz}{z-a} = 2\pi i$ over the circle $|z - a| = r$

i) Define Bilinear transformation.

j) Find the residue of $f(z) = \frac{z}{z^2+1}$ at each pole.

k) Find the invariant points for the transformation $w = \frac{z-1}{z+1}$

PART – B

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

3 x 16 = 48 M

2. a) Find the real root of the equation $\cos x = xe^x$ using Regula-Falsi method. 8 M

b) Find the no. of men getting wages below Rs. 15 from the following data. 8 M

Wages in Rs.	0-10	10-20	20-30	30-40
No. of men	9	30	35	42

3. a) Evaluate $y(0.2)$ using fourth order Runge-Kutta method, given that $y' = x + y^2, y(0) = 1$ 8 M

b) Solve $y' = xy + 1,\ y(0) = 1$ using Taylor's series method and compute $y(0.1)$ 8 M

4. a) If f(z) is a regular function of z, prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right)|f(z)|^2 = 4\,|f'(z)|^2$ 8 M

b) Find an analytic function whose real part is
$e^{-x}(x\ sin\ y - y\cos y)$ 8 M

5. a) Evaluate $\int_0^{1+i}\ (x^2 - iy)\ dz$ along the paths
$(i)\ \ y = x$ $(ii)\ \ y = x^2$ 8 M

b) Find Taylor's expansion for the function $f(z) = \frac{1}{(1+z)^2}$ about the point $z = -i$ 8 M

6. a) Using the method of contour integration, prove that
$\int_0^{2\pi} \frac{d\theta}{2+cos\theta} = \frac{2\pi}{\sqrt{3}}$ 8 M

b) Find the bilinear transformation which maps the points $z = 1,\ i, -1$ into the points $w = \ i,\ 0, -i$. Hence find the image of $|z|< 1$ 8 M