PVP 12

Code: EC3T1

II B.Tech - I Semester – Regular Examinations - December 2014

ENGINEERING MATHEMATICS - III
(ELECTRONICS & COMMUNICATION ENGINEERING)

Duration: 3 hours Marks: 5x14=70

Answer any FIVE questions. All questions carry equal marks

1. a) Find the cube root of 41 by using Newton-Raphson method. 7 M

   b) Using Regula-Falsi method find a real root of $e^x \sin x = 1$. 7 M

2. a) From the following data, calculate g(0.25) using Newton's forward interpolation. 7 M

x	0.1	0.2	0.3	0.4	0.5
g(x)	9.9833	4.9696	3.2836	2.4339	1.9177

   b) Use Lagrange formula to calculate f(3) from the following table: 7 M

x	0	1	2	4	5	6
f(x)	1	14	15	5	6	19

3. a) Find the first and second derivatives of the function tabulated below, at the point $x = 1.1$. 7 M

x	1.0	1.2	1.4	1.6	1.8	2.0
f(x)	0	0.128	0.544	1.296	2.432	4.00

b) Use Trapezoidal rule to evaluate $\int_0^1 x^3 dx$ by considering five sub-intervals. 7 M

4. a) Perform two iterations of picard's method to find an approximate solution of the initial value problem $y' = x + y^2; y(0) = 1$. 7 M

b) Find the solution $y(0.1)$ of the initial value problem $y' = -2ty^2, y(0) = 1$, with $h = 0.1$, using Runge-Kutta method of order four. 7 M

5. a) Show that the real and imaginary parts of the function $w = \log z$ satisfy the Cauchy-Riemann equations when z is not zero. 7 M

b) Construct an analytic function of the form $f(z) = u + iv$, where $v = \tan^{-1}\left(\frac{y}{x}\right)$, $x \neq 0, y \neq 0$. 7 M

6. a) Evaluate $\int_C \frac{\cos \pi z}{z^2-1} dz$, where C is around a rectangle with vertices $2 \pm i, -2 \pm i$. 7 M

b) Find the Taylor's expansion of the function $f(z) = \frac{2z^3+1}{z^2+z}$ about the point $z = i$. 7 M

7. a) Find the sum of residues of $f(z) = \frac{\sin z}{z\cos z}$ at its poles inside the circle $|z| = 2$. 7 M

b) By integrating around a unit circle, evaluate $\int_0^{2\pi} \frac{\cos 3\theta}{5-4\cos\theta} d\theta$. 7 M

8. a) Find the bilinear transformation which maps the points $z = 1, i, -1$ into the points $w = 0, 1, \infty$. 7 M

b) Show that the bilinear transformation $w = \frac{2z+3}{z-4}$ maps the circle $x^2 + y^2 - 4x = 0$ into the line $4u + 3 = 0$. 7 M