PVP 20

Code: 20BS1302

II B.Tech - I Semester – Regular Examinations - FEBRUARY 2022

NUMERICAL METHODS AND COMPLEX VARIABLES

(Common for ECE, EEE)

Duration: 3 hours Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

UNIT – I

1. a) Obtain a real root for $e^x \sin x = 1$, using Regula Falsi method. 7 M

b) Obtain a root correct to three decimal places for the equation $x^3 - x - 2 = 0$ using Newton- Raphson method. 7 M

OR

2. a) Determine $y(54)$ of the following table using Newton's forward formula 7 M

x	50	60	70	80
y	205	225	248	274

b) Given $x = 1,2,3,4$ and $f(x) = 1,2,9,28$ respectively, obtain $f(3.5)$ using Lagrange's method. 7 M

UNIT – II

3. a) Compute the first derivative at $x = 2.03$ of the following table function 7 M

x	1.96	1.98	2.00	2.02	2.04
y	0.7825	0.7739	0.7651	0.7563	0.7473

b) Evaluate $\int_0^{10} \frac{dx}{1+x^2}$ by using Simpson's 1/3 rule. 7 M

OR

4. Use fourth order of Runge-Kutta method to evaluate y(0.1) and y(0.2) given that $y^1 = x + y,\ y(0) = 1$. 14 M

UNIT-III

5. Prove that the function f(z) defined by $f(z) = \begin{cases} \frac{x^3(1+i)-y^3(1-i)}{x^3+y^3}, & (z \neq 0) \\ 0 & (z = 0) \end{cases}$ is continuous and Cauchy-Riemann equations are satisfied at the origin, yet $f'(0)$ does not exist. 14 M

OR

6. Using Milne-Thompson method , determine the analytic function f(z) whose real part is $y + e^x cosy$. 14 M

UNIT – IV

7. a) Evaluate $\int_C (y^2 + 2xy)dx + (x^2 - 2xy)dy$ where C is the boundary of the region by y = x^2 and x = y^2. 7 M

b) Evaluate $\int_C \frac{z^3 e^{-z}}{(z-1)^3} dz$, where C is |z-1|=1/2 using cauchy's integral formula. 7 M

OR

8. a) Obtain Taylor's series to represent the function $\frac{z^2-1}{(z+2)(z+3)}$, in the region |z|<2. 7 M

b) Expand $f(z) = \frac{e^{2z}}{(z-1)^3}$ about z = 1 as a Laurent's series. 7 M

UNIT – V

9. a) Define removable singularity and singularities at infinity. 7 M

b) Obtain the singular points and isolated singular points of $f(z) = \frac{z^2-1}{(z+2)(z+3)}$ 7 M

OR

10. a) Determine the residues of $\frac{z^2-2z}{(z+1)^2(z^2+1)}$ at it poles. 7 M

b) Show that $\int_0^{2\pi} \frac{d\theta}{2+Cos\theta} = \frac{2\pi}{\sqrt{3}}$ 7 M