PVP 23

Code: 23BS1302

II B.Tech - I Semester – Supplementary Examinations - MAY 2025

NUMERICAL METHODS AND COMPLEX VARIABLES
(ELECTRICAL & ELECTRONICS ENGINEERING)

Duration: 3 hours Max. Marks: 70

Note: 1. This question paper contains two Parts A and B.
2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.
3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.
4. All parts of Question paper must be answered in one place.

PART – A

1.a)	Find the missing term in the following data X: 0, 1, 2, 3, 4 Y: 1, 3, 9, -, 81
1.b)	Write the relation between Δ and E .
1.c)	Use Euler's Method to find the approximation to the solution of y at $x = 0.1$ to the initial value problem $\frac{dy}{dx} = 3x + y^2, y(0) = 1$.
1.d)	Write Simpson's 1/3 rule for integration.
1.e)	Show that $f(z) = z + 2\bar{z}$ is not Analytic anywhere in the complex plane.
1.f)	Write C-R Equations in Polar form.
1.g)	State Cauchy Integral formula.
1.h)	Expand $f(z) = \sin z$ in Taylor's series about $z = \frac{\pi}{4}$
1.i)	Determine the poles of $(z) = \frac{z}{cosz}$.

1.j)	Find the residue of $f(z) = \frac{z^2}{(z-a)(z-b)(z-c)}$ at $z = a$.

PART – B

					Max. Marks
UNIT-I					
2	a)	Explain about Newton-Raphson method.			5 M
	b)	Find the smallest positive root of $x^3 + x^2 - 1 = 0$ up to 2nd decimal accuracy using Bisection method.			5 M
OR					
3	a)	Find $y(1.6)$ using Newton's Forward difference formula from the table x: 1, 1.4, 1.8, 2.2 y: 3.49, 4.82, 5.96, 6.5			5 M
	b)	Using Lagranges interpolation formula find y at $x = 2$ from the following data x: 0, 1, 3, 4 y: -12, 0, 6, 12			5 M
UNIT-II					
4		Find an approximate solution of $y' = \frac{y-x}{y+x}$ such that y(0)=1 at x=0.1 using 4th order Runge-Kutta method.			10 M
OR					
5	a)	Evaluate $\int_0^{\frac{\pi}{2}} \frac{dx}{1+x^2}$ using Trapezoidal rule.			5 M
	b)	Evaluate $\int_0^6 \frac{dx}{1+x^2}$ using Simpsons 3/8th rule and also compare it with an exact value.			5 M

	UNIT-III	
6	If f(z) is a regular function of z, prove that $\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}\right)\lvert f(z)\rvert^2 = 4\lvert f'(z)\rvert^2$	10 M
	OR	
7	Construct an analytic function whose real part is $u = \frac{x}{x^2+y^2}$	10 M
	UNIT-IV	
8	Evaluate $\int_C \frac{\cos\pi z^2}{(z-1)(z-2)^3}dz$ where C is $\lvert z\rvert = 3$	10 M
	OR	
9	Obtain the Laurent series expansion of the function $\frac{7z-2}{(z+1)z(z-2)}$, for 1< |z+1|<3	10 M
	UNIT-V	
10	Evaluate $\int_C \frac{12z-7}{(2z+3)(z-1)^2}dz$ where C is $x^2+y^2=4$ using Residue theorem.	10 M
	OR	
11	Show by Contour integration, $\int_0^\infty \frac{dx}{(x^2+a^2)^2} = \frac{\pi}{4a^3}$	10 M