R22

ANURAG Engineering College
(An Autonomous Institution)
II B.Tech I Semester Supplementary Examinations, June/July – 2024
NUMERICAL METHODS AND COMPLEX VARIABLES
(COMMON TO EEE & ECE)

Time: 3 Hours   **Max. Marks: 60**

Section – A (Short Answer type questions)   (10 Marks)
Answer All Questions

		Course Outcome	B.T Level	Marks
1.	Explain periodic function with examples.	CO1	L1	1M
2.	State Fourier integral theorem.	CO1	L1	1M
3.	Gauss Seidal method is also termed as a method of _____	CO2	L1	1M
4.	Write Lagrange's Interpolation formula	CO2	L1	1M
5.	Use the trapezoidal rule evaluate : $\int_1^2 \frac{1}{x}\,dx$ with h=0.5	CO3	L1	1M
6.	Find y(1) Use the Eulers formula for $\frac{dy}{dx} = x+y$, with y(0)=1	CO3	L1	1M
7.	Write Cauhcy's Riemann Equations in Cartesian coordinates	CO4	L1	1M
8.	Explain harmonic functions	CO4	L1	1M
9.	Obtain singular point of $f(z) = \frac{1}{z-2}$	CO5	L1	1M
10.	State Cauchy's theorem	CO5	L1	1M

Section B (Essay Questions)
Answer all questions, each question carries equal marks.   (5 X 10M = 50M)

			Course Outcome	B.T Level	Marks
11.	A)	Obtain a Fourier series to represent $f(x)=x-x^2$ from $x= -\pi$ to $x=\pi$ and deduce that $\frac{\pi^2}{12} = \frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + ...$	CO1	L2	10M

OR

			Course Outcome	B.T Level	Marks
	B)	Determine s the Fourier cosine transform of $f(x) = \begin{cases} \cos ax, & if\ 0 < x < a \\ 0, & if\ x \geq a \end{cases}$	CO1	L3	10M

			Course Outcome	B.T Level	Marks
12.	A)	Obtain a real root of the equation $-3x + \cos x + 1 = 0$, by Newton Raphson Method up to four decimal places	CO2	L2	10M

OR

			Course Outcome	B.T Level	Marks
	B)	From the following data, Estimate the number of persons having incomes at 10, using appropriate interpolation formula.	CO2	L3	10M

Income:	4	5	6	8	9
No. of persons:	6	9	7	5	10

			Course Outcome	B.T Level	Marks
13.	A)	Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using	CO3	L2	10M

     i) Trapezoidal rule   ii) simpson's 1/3 rule

OR

B) Solve the initial value problem $\frac{dy}{dx} = -2xy^2, y(0) = 1$ with h=0.5 on the interval[0, 1]. Use the fourth order classical Runge-Kutta method   CO3   L3   10M

14. A) Obtain the analytic function $f(z) = u(r,\theta) + iv(r,\theta)$ such that $v(r,\theta) = r^2 \cos 2\theta - r \cos \theta + 2$.   CO4   L2   10M

OR

B) Obtain the bilinear transformation that maps $z_1 = 1, z_2 = i, z_3 = -1$ into the points $w_1 = 0, w_2 = 1, w_3 = \infty$ respectively. Also determine the fixed points of the transformation   CO4   L3   10M

15. A) Evaluate , using Cauchy's integral formula $\oint_C \frac{e^{2z}}{(z+i)^4} dz$ where C is the circle $|z| = 3$ CO5   L2   10M

OR

B) Obtain Taylor's expansion of $f(z) = \frac{1}{(z+1)^2}$ about the point z= -i   CO5   L3   10M