Question Paper Code: R18A21HS03

R18

ANURAG Engineering College

(An Autonomous Institution)

II B.Tech I Semester Supplementary Examinations, June/July - 2024

NUMERICAL METHODS & PARTIAL DIFFERENTIAL EQUATIONS

(MECHANICAL ENGINEERING)

Time: 3 Hours **Max.Marks:75**

Section – A (Short Answer type questions) (25 Marks)

Answer All Questions		Marks	Course Outcome	B.T Level
1.	Briefly Explain Bisection Method	2M	CO1	L1
2.	Define forward difference, backward difference and divided difference	3M	CO1	L2
3.	Write the Newton's cotes quadrature formulae	2M	CO2	L1
4.	Find the Trapezoidal rule from Newton's cotes qudrature formulae	3M	CO2	L2
5.	Briefly explain Euler's Method	2M	CO3	L1
6.	Write mathematical steps in Runge Kutta method	3M	CO3	L2
7.	Write the mathematical steps to solve Lagrange's Linear equation	2M	CO4	L1
8.	Write the Charpit's auxiliary equations	3M	CO4	L2
9.	Explain Method of separation of variables with an example	2M	CO5	L1
10.	Write procedural steps to classification of second order partial differential equations	3M	CO5	L2

Section B (Essay Questions)

Answer all questions, each question carries equal marks. **(5 x 10M = 50M)**

11.A)	Evaluate $\sqrt{12}$ to four decimal places by Newton's Iterative method	10M	CO1	L3
	OR			
B)	Find a root of the equation $x^3 - x - 1 = 0$ using bisection method to four decimal places	10M	CO1	L3
12.A)	Compute $\frac{dy}{dx}$ at x = 1.5 given the table x: 0 1 2 3 4 5 y: 1 2 5 7 14 26	10M	CO2	L3
	OR			
B)	Evaluate $\int_0^6 \frac{1}{1+x^2} dx$ by Simpson's 1/3 rd rule	10M	CO2	L3

13. A)	Using Euler's method , find approximate value of y when x = 1.0 of $\frac{dy}{dx} = 1 - 2xy$, y(0) = 0 with h = 0.2	10M	CO3	L3
	OR			
B)	Using Runge-Kutta method of fourth order, solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ with y(0) = 1 at x = 0.1 , 0.2	10M	CO3	L3
14. A)	Form the partial differential equation from $z = f\left[\frac{xy}{z}\right]$ by eliminating the Arbitrary function 'f '.	10M	CO4	L3
	OR			
B)	Find the complete integral of the partial differential equationp^2q^2 (px + qy – z) = 2	10M	CO4	L3
15. A)	Determine the solution of the one-dimensional heat equation $\frac{\partial u}{\partial t} = \alpha^2 \frac{\partial^2 u}{\partial x^2}$ with the boundary conditions u (0, t) = u (l, t) = 0 for t > 0 and u(x, 0) = x where 'l' is the length of the rod.	10M	CO5	L3
	OR			
B)	A tightly stretched flexible string has its ends fixed at x = 0 and x = l. At time t = 0, the string is given a shape defined $f(x) = \mu x(l - x)$, , where μ is a constant, and then released. Find the displacement of any point x of the string at any time t	10M	CO5	L3