GURU NANAK INSTITUTE OF TECHNOLOGY
An Autonomous Institute under MAKAUT
2021
NUMERICAL METHODS AND STATISTICS
M(CSE)401

TIME ALLOTTED: 3HR **FULL MARKS:70**

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable

GROUP – A
(Multiple Choice Type Questions)

Answer any ***ten*** from the following, choosing the correct alternative of each question: **10×1=10**

			Marks	CO No
1.	(i)	Which of the following method does not always guarantee convergence? (a) Regula Falsi method (b) Bisection method (c) Newton Raphson method (d) None of These	1	CO1
	(ii)	Median of the set {5,8,7,20,13,3,11} is (a) 7.5 (b) 7 (c) 8 (d) 20	1	CO1
	(iii)	Number of significant digits of 0.0012031 is (a) 6 (b) 5 (c) 7 (d) 4	1	CO2
	(iv)	The 5^{th} order forward difference of 5^{th} degree polynomial is [take h=1] (a) 24 (b) 120 (c) 720 (d) 0	1	CO1
	(v)	Newton Raphson method has order of convergence (a) 1 (b) 2 (c) 3 (d) None of these	1	CO3
	(vi)	Degree of precision of Simpson's $1/3^{rd}$ Rule of Integration is (a) 1 (b) 2 (c) 3 (d) 4	1	CO1

(vii)	Lagrange Interpolation formula is applicable if nodes are (a) Equispaced (b) Un equispaced (c) Both equispaced and un equispaced (d) None of these	1	CO2
(viii)	Trapezoidal rule of integration is applicable when the number of equal subintervals is (a) 12 (b) 13 (c) 11 (d) All of these	1	CO1
(ix)	Correlation Coefficient lies in (a) (-1,1) (b) [-1,1] (c) [0,1] (d) None of these	1	CO1
(x)	Euler method for ODE has a truncation error of the order of (a) h^3 (b) h^6 (c) h^2 (d) h^5	1	CO1
(xi)	E is equivalent to (a) e^{hD} (b) e^{-hD} (c) $\Delta \nabla$ (d) None of these	1	CO3
(xii)	Gauss elimination method is (a) direct method (b) indirect method (c) iterative method (d) None of These	1	CO1

GROUP – B

(Short Answer Type Questions)

Answer any ***three*** from the following: **3×5=15**

		Marks	**CO No**
2.	Compute one root of $x^3 - 5x - 7 = 0$, correct to two decimal places using regula falsi method. Given that root lies in [2,3]	5	CO3
3.	Prove that $\Delta\nabla \equiv \Delta - \nabla$	5	CO2
4.	Prove that the value of the correlation coefficient (r) will lie in between -1 to 1.	5	CO2
5.	Evaluate $\int_0^1 \frac{dx}{x^2+1}$ using Simpson's $1/3^{rd}$ rule of integration, taking 6 equal subintervals, correct to 3 decimal places.	5	CO3

6. Find mean, variance and standard deviation of first 10 natural numbers. — 5 — CO3

GROUP – C
(Long Answer Type Questions)
Answer any ***three*** from the following: **3×15=45**

			Marks	CO No
7.	(a)	Solve the following system of equation by LU factorization method $2x-3y+10z=3,\ -x+4y+2z=20, 5x+2y+z=-12$	8	CO3
	(b)	Solve the system of equations using Gauss Seidel method, correct to 2 decimal places: $5x_1+2x_2+x_3=8$; $2x_1+10x_2+3x_3=15$; $3x_1+2x_2+14x_3=19$	7	CO3
8.	(a)	Find the value of $f(1.6)$ correct up to 2 decimal places from the following table (using Newton's Forward Interpolation Formula):	8	CO3

x:	1	2	3	4	5
$f(x)$	1.19	1.31	1.55	1.89	1.99

	(b)	Compute $y(2.1)$ by Runge Kutta method of fourth order for the differential equation $\frac{dy}{dx}=xy, y(2)=2, take\ h=0.1$	7	CO3
9.	(a)	Compute one positive root of $x^x+2x-2=0$, correct to two decimal places by method of bisection. Given that the root lies in [0.5,1]	8	CO3
	(b)	Use Newton Raphson method to compute a root of $x\sin x+\cos x=0$, correct to 3 decimal places. Take x0=2.5	7	CO3
10.	(a)	Find the regression lines of y on x and x on y for the sample	7	CO3

x	2	4	6	8	10
y	2	8	16	19	22

	(b)	Fit a straight line to the following data	8	CO3

x	1	6	7	8	9
y	6	9	16	21	29

11.	(a)	Find correlation coefficient from the following table $\begin{bmatrix} x & 1 & 2 & 3 & 5 \\ y & 2 & 7 & 25 & 61 \end{bmatrix}$	5	CO3
	(b)	Find median from the following frequency distribution	7	CO3

Class	5-10	10-15	15-20	20-25	25-30
Frequency	5	9	17	19	10

	(c)	Prove that $\rho=\sqrt{b_{xy}Xb_{yx}}$	3	CO2