2019
NUMERICAL METHODS AND STATISTICS
M (IT) -302

TIME ALLOTTED: 3 Hours **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)

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

		Marks	CO No.
1(i)	Newton Raphson method fails when (a) f'(x)=1 (b) f'(x)= -1 (c) f'(x)=0 (d) None of These	1	CO1
(ii)	Newton Raphson method has order of convergence (a) 2 (b) 1.62 (c) 1 (d) none of these.	1	CO1
(iii)	Number of significant digits of 1235.0000 is (a) 5 (b) 4 (c) 8 (d) none of these	1	CO2
(iv)	If each item is increased by 20 then A.M is increased by (a) 20 (b) 1.0 (c)20.2 (d) None of these	1	CO3
(v)	Which of the following relation is false (a) $\Delta-\nabla\equiv\Delta\nabla$ (b) $E^{-1}\equiv \mathrm{I}-\nabla$ (c) $\Delta\nabla\equiv\Delta\nabla$ (d) None of these.	1	CO3
(vi)	Degree of precession of Simpson's 1/3rd Rule of Integration is (a) 1 (b) 2 (c) 3 (d) 4	1	CO1
(vii)	Correlation coefficient lies between (a) 0 to 1 (b) 1 to 2 (c) -1 to 0 (d) -1 to 1	1	CO1
(viii)	The class having maximum frequency is called (a) Modal class (b) median class (c) Mean class (d) none of these	1	CO1
(ix)	In trapezoidal rule of integration of finding $\int_a^b f(x)\,dx$, f(x)is approximated by (a) linear segment (b) parabola (c) circular sector (d) part of ellipse	1	CO1
(x)	Runge Kutta 4th method for ODE has a truncation error of the order of (a) h^3 (b) h^6 (c) h^4 (d) h^5	1	CO1

(xi) The rate of convergence of Bisection method — 1 — **CO-3**

(a)2 (b)3 (c)4 (d)1

(xii) Gauss Seidel method is — 1 — CO1

(a) direct method (b) indirect method

(c) iterative method (d) None of These

GROUP – B
(Short Answer Type Questions)

(Answer any *three* of the following) — **3 x 5 = 15**

Marks CO No.

2. Use Newton Raphson method to compute $\sqrt[4]{27}$, correct to 3 decimal places. — 5 — CO3

3. Do these two lines $2x+3y=7$ and $3y-7x-2=0$ as the regression lines? Give reasons. — 5 — CO2

4. Find the missing term in the following table: — 5 — CO-3

x	0	5	10	15	20	25
f(x)	6	10	-	17	-	31

5. Evaluate $\int_1^3 \frac{xdx}{x^2+3}$ by Trapezoidal rule of integration, taking 6 equal subintervals and hence find the value of $\log_e \sqrt{3}$, correct to 3 decimal places. — 5 — CO3

6. Solve the following differential equation by Euler's method for x=0.25 taking step length h=0.05, correct to 2 decimal places — 5 — CO3

$\frac{dy}{dx}=2x+y$, y=1 when x=0.

GROUP – C
(Long Answer Type Questions)

(Answer any *three* of the following) — **3 x 15 = 45**

Marks CO No.

7. a) Solve the system of equations by Gauss Seidel method, correct to one decimal place: — 8 — CO3

$$7x_1 + x_2 + x_3 = 9$$
$$2x_1 + 9x_2 + 5x_3 = 16$$
$$3x_1 + 2x_2 + 10x_3 = 15$$

b) Solve the system of equations by LU factorization method: — 7 — CO3

$2x-3y+10z=3,\ -x+4y+2z=20, 5x+2y+z=-12$

8. a) Find the value of $f(2.6)$ correct up to 4 decimal places from the following table (using Newton's Backward Interpolation Formula): 8 CO3

x:	1.9	2.1	2.3	2.5	2.7
$f(x)$	1.31	1.41	1.51	1.58	1.64

b) Compute $y(0.2)$ correct to 2 decimal places by Runge Kutta method of fourth order for the differential equation $\frac{dy}{dx} = y - x, y(0) = 1, take\ h = 0.1$ 7 CO3

9. a) Compute one positive root of $e^x - 3x = 0$, correct to two decimal places by Regula falsi method. 8 CO3

b) Compute one positive root of $3x - \cos x - 1 = 0$, correct to three decimal places by Newton Raphson method. 7 CO3

10. a) Find the regression line of y on x for the sample 8 CO3

x	2	4	6	8	10
y	10	11	25	30	38

b) Using curve fitting method find a straight line to the following data 7 CO3

Year	10	11	12	13	14
Productivity in Kg	8	10	12	10	16

Also find the expected production in year 16.

11. (a) From the random sample of size 49 drawn from a normal population of standard deviation 3, find the 99% confidence interval of the population mean. Find the interval if the mean of such a sample is 3. Given that $\int_0^{2.58} \phi(z)dz = 0.495$. 8 CO3

(b) If T is an unbiased estimator of θ, prove that $\sqrt{T}$ is biased estimator of $\sqrt{\theta}$. 7 CO2