Graphic Era HILL UNIVERSITY
Established by an Act of the State Legislature of Uttarakhand (Adhiniyam Sankhya 12 of 2011)
University under section 2(f) of UGC Act, 1956

End Term (Odd) Semester Examination December 2024

Roll no.....

Name of the Course and semester: B.Tech., V Sem
Name of the Paper: CBNST
Paper Code: TMA-502
Time: 3 hour

Maximum Marks: 100

Note:

(i) All the questions are compulsory.
(ii) Answer any two sub questions from a, b and c in each main question.
(iii) Total marks for each question is 20 (twenty).
(iv) Each sub-question carries 10 marks.

Q1 (10 X 2=20 marks)

(a) Find the positive value of $(17)^{\frac{1}{3}}$ correct to three decimal places using Newton's-Raphson method. **CO1**

(b) Find the real root of the equation $2x - \log_{10} x = 7$ using iteration method.

(c) Using Gauss-Seidel method to solve the following system of linear equations:
$8x-3y+2z=20;\ 4x+11y-z=33;\ 6x+3y+12z=36.$

Q2 (10 X 2=20 marks)

(a) Find the value of y at x= 46 from the following table: **CO2**

x=	45	50	55	60	65
y=	114.84	96.16	83.32	74.48	68.48

(b) Using Newton's divided difference formula find $f(15)$ from the following table:

x= 4	5	7	10	11	13
y=48	100	294	900	1210	2028

(c) Construct a backward difference table for the data

x=	10	20	30	40	50
y=	1	1.3010	1.4771	1.6021	1.6990

then find the value of $\nabla^3 y_{40}$ *and* $\nabla^4 y_{50}$

Q3 (10 X 2=20 marks)

(a) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ using Trapezoidal rule, Simpson's 1/3rd rule and Simpson's 3/8th rule. **CO3**

(b) If $\frac{dy}{dx} = 1 + y^2$ and y=0 at x=0. Find an approximate value of y at x=0.4 by Runge-Kutta method of fourth order taking h=0.2.

(c) Using finite difference method fin y(0.25) and y(0.5) satisfying the differential equation $\frac{d^2y}{dx^2} + y = x$ subject to the boundary conditions y(0)=0, y(1)=2.

Q4 (10 X 2=20 marks)

(a) Using method of least square fit a second-degree parabola to the following data: **CO4**

x= 1	2	3	4	5	6	7	8	9
y= 2	6	7	8	10	11	8	13	5

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(b) Fit a curve of the type $xy = ax + b$ to the following data:

x= 1	3	5	7	9	10
y= 36	29	28	26	24	15

(c) Fit a curve of the form $y = ab^x$ to the following data:

x= 2	3	4	5	6
y= 144	172.3	207.4	248.8	298.5

Q5 (10 X 2=20 marks)

(a) Calculate the coefficient of correlation between x and y, where **CO5**

x= 23	27	28	28	29	30	31	33
y= 15	20	20	27	21	29	27	29

(b) What does a correlation coefficient represent, and how does its value range from -1 to 1? Provide examples of variables that might have positive, negative, and zero correlations.

(c) A dataset of students' study hours (X) and their test scores (Y) includes the following points (x, y): (2, 65), (4, 70), (6, 75), (8, 85), (10, 90).

(i) Calculate the slope and intercept for the regression line predicting test scores based on study hours.

(ii) Using the equation, predict the test score for a student who studied for 7 hours.