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SNS College of Technology, Coimbatore-35.

(An Autonomous Institution)

Internal Assessment -III

Academic Year 2023-2024 (Even)

Fourth Semester

(Common to Agri, Auto, Food Technology, Mech)

A

19MAT202 – STATISTICS AND NUMERICAL METHODS (REGULATION 2019)

Time: 1.30 Hours

Maximum Marks: 50

PART – A (5 x 2 = 10 MARKS)

ANSWER ALL QUESTIONS

- | | | CO | Blooms |
|----|---|-----|--------|
| 1. | Write the inverse formula of Lagrange's interpolation . | CO4 | (Rem) |
| 2. | Given $f(0) = -2, f(1) = 2$ and $f(2) = 8$. Find the value of y at $x=3$ using Newton's interpolation formula. | CO4 | (App) |
| 3. | A curve passes through $(0, 1), (0.25, 0.9412), (0.5, 0.8), (0.75, 0.64)$ and $(1.0, 0.5)$. Find the area between the curve, x - axis and $x = 0, x = 1$ by Simpson's rule . | CO4 | (Und) |
| 4. | Using Euler's method find $y(0.1)$ if $\frac{dy}{dx} = x^2 + y^2, y(0) = 1$. | CO5 | (App) |
| 5. | Write down the formula for Fourth order Runge- Kutta method to solve $y' = f(x, y)$ with $y(x_0) = y_0$. | CO5 | (Rem) |

PART –B (13+13+14 = 40 MARKS)

ANSWER ALL QUESTIONS

6. a) i) Using Lagrange's Interpolation formula find $y(2)$ from the following table. CO4 (App) (6)

x	0	1	3	4
y	-12	0	6	12

- ii) From the following table of half-yearly premium for policies maturing at different ages, estimate the premium for policies maturing at age 63. CO4 (App) (7)

Age: x	45	50	55	60	65
Premium: y	114.84	96.16	83.32	74.48	68.48

(OR)

- b) i) Compute the first derivative of y at x=1.5 from the table below. CO4 (App)

x	1.5	2.0	2.5	3.0	3.5	4.0
y	3.375	7.00	13.625	24.0	38.875	59.0

(7)

- ii) Using Trapezoidal rule, evaluate $\int_{-1}^1 \frac{dx}{1+x^2}$ by taking 8 intervals. CO4 (Ana)

(6)

7.

- a) i) Compute y(0.2) correct to 4 decimal places using Taylor Series CO5 (App)

method, given $\frac{dy}{dx} = x^2 - y$ and $y(0) = 1$.

(6)

- ii) By applying modified Euler's method compute y(0.1) with h= 0.1 CO5 (App)

from $y' = 1 - y$, $y(0) = 0$.

(7)

(OR)

- b) Apply Milne's method find y(0.8) given $\frac{dy}{dx} = x^3 + y$ and $y(0) = 2$, CO5 (Ana)

(13)

$y(0.2) = 2.073$, $y(0.4) = ?$ and $y(0.6) = ?$ (find using Euler's method).

The population of a certain town is given below, determine the rate of growth of the population in 1971.

8. a) i)

Year x:	1931	1941	1951	1961	1971
Population in thousands} y:	40.62	60.80	79.95	103.56	132.65

CO4 (App)

(7)

- ii) Dividing the range into 10 equal parts, find the value of (Ana)

$\int_0^{\pi} \sin x dx$ by Simpson's rule. Also verify with normal integration. CO4

(7)

(OR)

- b) Detect y(0.2), using Fourth order Runge-Kutta method, given CO5 (Ana)

$\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ $y(0) = 1$ at x=0.2.

(14)

Rem/Und: Remember/ Understand

App: Apply

Ana: Analyze

Eva: Evaluate

Cre: Create