Reg No:..... K25FY2312
Name :.....

Second Semester FYUGP Computational Mathematics Examination
APRIL 2025 (2024 Admission onwards)
KU2DSCCMT101 (COMPUTATIONAL CALCULUS 2)
(DATE OF EXAM: 28-4-2025)

Time : 120 min Maximum Marks : 70

Part A (Answer any 6 questions. Each carries 3 marks)

1. Express

$$\lim_{n\to\infty} \sum_{i=1}^{n} \left(x_i^3 + \sin(x_i)\right) \Delta x$$

as an integral on the interval $[0, \pi]$ 3

2. Evaluate

$$\int_0^5 x\, dx$$

3

3. Write the integral representing the area of the region enclosed by the given curves

$$y = 2^x, y = 3^x, x = 1$$

3

4. Find the length of the arc of the curve

$$y = x$$

from (0,0) to (1,1). 3

5. Write the arc length function formula. 3

6. Give a boundary for error of A_n in midpoint end point sum. 3

7. Give a boundary for error of A_n in right end point sum. 3

8. Give a boundary for error of A_n in Simpson's rule. 3

Part B (Answer any 4 questions. Each carries 6 marks)

9. Express

$$\int_0^2 e^x\, dx$$

as the limit of a sum 6

10. Find the area of the region bounded by the curves

$$y = sinx, y = cosx, x = 0. and x = \frac{\pi}{2}$$

6

11. Use calculus to find the area of the triangle with the vertices

$$(0,0)\ (3,1)\ (1,2)$$

6

12. Evaluate $\int_0^1 \frac{1}{1+x} dx$ using midpoint sum with spacing of x- coordinate $h = 0.25$.

6

13. Evaluate $\int_0^\pi xsin(x)dx$, using trapezoidal rule with five ordinates. 6

14. Evaluate $\int_0^1 \frac{1}{1+x}$ using Simpson's rule with spacing of x- coordinate $h = 0.5$ 6

Part C (Answer any 2 question(s). Each carries 14 marks)

15. Prove that (a)

$$\int \tan^n x dx = \frac{\tan^n (n-1)x}{n-1} - \int \tan^{n-2} x dx$$

(b)

$$\int \sec^n x dx = \frac{\tan x \sec^n (n-2)x}{n-1} - \frac{n-2}{n-1} \int \sec^{n-2} x dx \quad (n \neq 1)$$

14

16. Find the volume of the solid obtained by rotating the region enclosed by the curves

$$y = x$$

and

$$y = x^2$$

a) about the x-axis
b)about the line y = 2. 14

17. The arc of the parabola

$$y = x^2$$

from (1,1)to (2,4) is rotated about the y-axis. Find the area of the resulting surface.
14