Reg. No.: .....

Name: .....

University of Kerala

U8951

Second Semester FYUGP Degree Examination, April 2025

Discipline Specific Core Course

MATHEMATICS

UK2DSCMAT108 - Integral Calculus and Series

Academic Level: 100-199

Time: 1 Hour 30 Minutes(90 Mins.) **Max. Marks: 42**

Part A. 6 Marks.Time:6 Minutes.(Cognitive Level:Remember(RE)/Understand(UN)) Objective Type. 1 Mark Each.Answer all questions

Qn No.	Question	CL	CO
1	What is meant by a cylindrical shell?	RE	2
2	$\int \sin x \, \mathrm{d}x = \ldots$	RE	1
3	State True/False: $\sum_{n=1}^{\infty} \frac{1}{n}$ is convergent.	UN	4
4	Give an example of an increasing sequence.	UN	3
5	To integrate $\int \frac{1}{3x^2} \, \mathrm{d}x$ what substitution will you give?	UN	1
6	Give an example of a geometric series.	UN	3

Part B.8 Marks.Time:24 Minutes.(Cognitive Level:Understand(UN)/Apply(AP))Short Answer. 2 marks each.Answer all questions

Qn No.	Question	CL	CO
7	State Comparison test for convergence of series	UN	4
8	Evaluate $\int x^2 \cos(1+x^3) \, \mathrm{d}x$.	UN	1
9	Solve the initial value problem: $\frac{\mathrm{d}y}{\mathrm{d}x} = \sin x$,given $y(\frac{\pi}{6}) = \frac{1}{2}$	AP	1
10	Find the rational number represented by the repeated decimal $0.784784784\ldots$.	AP	3

Part C. 28 Marks.Time:60 Minutes (Cognitive Level:Apply(AP)/Analyse(AN)/Evaluate(EV)/Create(CR)) Long Answer.7 marks each.Answer all 4 Questions choosing among options * within each question

Qn No.	Question	CL	CO
11	A) (a) Find the radius of convergence of $\sum_{k=0}^{\infty} \frac{3^k x^k}{k!}$ (b) Write the Taylor series of $\frac{1}{x+2}$ about $x = 3$ OR B) a) Find the area of the region enclosed between the curves $y = x^2$ and $y = x + 6$. b) Derive the formula for the volume of a right pyramid whose altitude is h and whose base is a square with sides of length a.	AP	5, 2
12	A) Find the Taylor series for the function $1/(x+2)$ about $x = 1$. OR B) Sketch the region enclosed by the curves $y = x^2$ and $y = \sqrt{x}$ and find its area.	AN	5, 2
13	A) (a) Evaluate $\int x\sqrt{x+1}\,\mathrm{d}x$ (b) Evaluate $\int_1^3 \frac{x+2}{\sqrt{x^2+4x+7}}\,\mathrm{d}x$ OR B) Find $\lim_{x\to 0} (1+\sin x)^{1/x}$.	EV	1, 2

Qn No.	Question	CL	CO
14	A) Let $f(x) = x^2 - 3x + 8$. Find (a) the intervals on which f is increasing, (b) the intervals on which f is decreasing, (c) the open intervals on which f is concave up, (d) the open intervals on which f is concave down, and (e) the x-coordinates of all inflection points. OR B) Find the volume of the solid that results when the region enclosed by the curves $y = \sqrt{x}$ and $x = y + 2$ is revolved about the y- axis.	CR	1, 2