Reg. No.: .....

Name: .....

University of Kerala

W7650

First Semester FYUGP Degree Examination, December 2025

Discipline Specific Core Course

MATHEMATICS

UK1DSCMAT102 - Differentiation, Sequence and Series

Academic Level: 100-199

2025-Admission

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	Write the general form of an exponential function.	RE	1
2	State divergence test.	RE	1
3	Find x such that logx=√2.	UN	2
4	A p-series converges if the value of p is − − − − − .	UN	1
5	Find the general term of the sequence n = 1, 1/ 5, 1/ 25, 1/ 125, . . ., starting with n = 1.	UN	3
6	Give an example of a conditionaly convergent series.	UN	1

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	Find the local linear and quadratic approximations of e^x at x=0 and the graph e^x and the two approximation together.	UN	3
8	A satellite that requires 7 watts of power to operate at full capacity is equipped with a radioisotope power supply. Whose power output P in watts is given by the equation $P = 75e^{-t/125}$.	UN	2
9	Find the first four Taylor polynomials for ln x about x = 2.	AP	3
10	Prove that $d/dx(\tan^2 x) = 2\tan x.\sec^2 x$	AP	1

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) Using definition, find the slopes of the tangent lines to the curve $y = \sqrt{x}$ at the point $(4, 2)$. (b) Compute the derivative of $\sqrt{5 + \sqrt{3x}}$. OR B) Find the rational number represented by the repeating decimal .321321.	AP	2, 2
12	A) Let $y = x^2 + 1$ find the average rate of change of y with respect to x over the interval [3, 5] and also find the instantaneous rate of change of y with respect to x when $x = 4$. OR B) Find the n th maclaurin polynomial for sin x	AN	1, 1
13	A) Let $y = x^2 + 1$, 1. Find average rate of change of y with respect to x over [3,5]. 2. Find the instantaneous rate of change of y with respect to x when x= -4. OR B) Evaluate 1. $\lim_{x \to 0^+} x \ln x$. 2. $\lim_{x \to \pi/4} (1 - \tan x) \sec 2x$.	EV	2, 2
14	A) Discuss the convergence of the following series: 1. $\sum_{k=1}^{\infty} \left(\frac{3k + 2}{2k - 1} \right)$. 2. $\sum_{k=1}^{\infty} (-1)^k \frac{2^k}{k!}$. OR B) 1. Find the derivative of $(x^2 + 5)^{\sin x}$. 2. Evaluate $\lim_{x \to 0} (e^x + x)^{\frac{1}{x}}$.	CR	2, 2

Qn No.	Question	CL	CO