

12.	A. - Let A and B subset of a universal set U. Define $A\Delta B = (A - B) \cup (B - A)$. - Draw Venn diagram for $A\Delta B$. - What is $A\Delta A$ - What is $A\Delta\emptyset$ - What is $A\Delta U$ - If $7m$ is an odd number then show that m is odd. OR B. Let $A = \mathbb{N} \times \mathbb{N}$. Define a relation R on A by $(a, b)R(c, d)$ iff $ab = cd$. - Show that R is an equivalence relation on A. - Find an equivalence class with exactly two elements. - List the elements in the equivalence class $E_{(9, 2)}$ - Find an equivalence class with exactly three elements.	Analyse	CO1 CO2
13.	A. State and prove division algorithm. OR B. - Find $\gcd(259, 119)$. - Prove that every integer greater than 1 is either a prime or is divisible by a prime.	understand	CO4
14.	A. - Suppose that p is a prime and $p^2 ab$. Show that if $\gcd(a, b) = 1$, then $p^2 a$ and $p^2 b$? - Find x and y such that $17x + 2y = 1$? OR B. - Show that there are infinitely many prime numbers? - Find an n with $1 < n < 10$ such that $\gcd(n, 60) = 1$	Apply	CO2

Part B. 8 Marks. Time:24 Minutes
Short answer. 2 Marks Each. Answer all Questions
(Cognitive Level: Remember/Understand/Apply)

Qn. No.	Question	Cognitive Level	Course (CO)	Outcome
7.	Construct the truth table for $\sim (p \Rightarrow q) \Leftrightarrow p \wedge (\sim q)$	Apply	CO1	
8.	Suppose $f : A \mapsto B$. Let $C_1, C_2 \subset A$. Then prove that if f is injective then $f(C_1 \cap C_2) = f(C_1) \cap f(C_2)$	understand	CO1	
9.	Show that if $d a$ and $d b$, then $d ax + by$?	understand	CO3	
10.	Show that if n is composite, then n has a prime factor $p \leq \sqrt{n}$?	Understand	CO3	

Part C. 28 Marks. Time:35 Minutes
Short-Answer. 7 Marks Each. Answer all Questions, choosing among options within each question.
(Cognitive Level: Understand/Analyse/Apply)

Qn. No.	Question	Cognitive Level	Course (CO)	Outcome
11.	A. - Let R be an equivalence relation on a set S. Then show that the equivalence class of R form a partition of the set S. Is the converse true? (Justify your answer). - If $a = 2^5 5^3 7^2 19$ and $b = 2^4 3^4 5^3 17$. Evaluate $\gcd(a, b)$. OR B. Let $f : A \rightarrow B$ and $g : B \rightarrow C$ be bijective. Then show that the composition $gof : A \rightarrow C$ is bijective and $(gof)^{-1} = f^{-1}og^{-1}$	Apply	CO1	

Reg No.:

Name :



U8189



University of Kerala

First Semester Degree Examination, November 2024

Four Year Undergraduate Programme

Multi Disciplinary Course

Mathematics

UK1MDCMAT101, Mathematical Thinking

Academic Level: 100-199

Time: 1 hours 30 Minutes

Max. Marks: 42

Part A. 6 Marks. Time: 5 Minutes

Objective Type. 1 Mark Each. Answer all Questions
(Cognitive Level: Remember/Understand)

Qn. No.	Question	Cognitive Level	Course (CO)	Outcome
1.	State Fundamental Theorem of Arithmetic .	Remember	CO3	
2.	Identify the antecedent and consequent of the following statement. If n is an integer, then $2n$ is an even number.	Understand	CO1	
3.	Negate the following statement. If (a_n) is convergent then (a_n) is monotone and bounded.	Understand	CO1	
4.	Find $\gcd(48, 244)$.	Understand	CO2	
5.	Show that the empty set $\emptyset \subseteq A$, for any set A .	Understand	CO1	
6.	Define an equivalence relation on the set $A = \{a, b\}$.	Remember	CO1	

