TEST - 1 EXAMINATION (Aug-Sept 2025)

B.C.A. - I Semester

COURSE CODE (CREDITS): 25B11MA111 (3)　　　　　　　　　　　MAX. MARKS: 15

COURSE NAME: FUNDAMENTALS OF MATHEMATICS

COURSE INSTRUCTORS: RKB*

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Note: All questions are compulsory. The candidate is allowed to make suitable numeric assumptions wherever required for solving problems

Q.No	Question	CO	Marks
Q1	In a **multi-core processor**, different tasks are scheduled to run in given **time intervals (in milliseconds)**. • Task A runs in interval: [0,10] • Task B runs in interval: [5,15] • Task C runs in interval: [12,20] (a) Find the **intersection** of intervals A and B (when both tasks run simultaneously). (b) Find the **intersection** of all three intervals A, B, and C (if any). (c) Find the **union** of all intervals (the total time covered by at least one task).	CO-1	3
Q2	(a) If $A \cap B = A \cap C$ then is it necessary that $B = C$? Justify. (b) If $A \cup B = A \cup C$ then is it necessary that $B = C$? Justify.	CO-1	2
Q3	The power set $P(A)$ of a set A is the set of all subsets of A. Suppose that $A = \{1, 2, 3, 4\}$. 　　a) How many elements are there in $P(A \times P(A)) \cup A$? 　　b) How many elements are there in $P(A \times P(A)) \cap A$?	CO-1	2
Q4	In **computer memory allocation**, addresses are often aligned to multiples of 4 bytes (32-bit systems). If two addresses are **congruent modulo 4**, they belong to the same memory block alignment. Show that the relation is an equivalence relation and find the equivalence class or hash basket of 21.	CO-2	4
Q5	Let $f: R \to R$ be defined as $f(x) = x^2 - 6x + 8$, find $f^{-1}(7)$ and $f^{-1}(0)$.	CO-2	2
Q6	A computer system stores data in **blocks of 512 bytes**. If a file has **4300 bytes**, how many **full blocks** are completely filled? How many **blocks in total** are required to store the file (since the last block may not be completely full)?	CO-2	2

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