Name of Student: ..... *Roll*

Course Code and Name: 20MCA101, MATHEMATICAL FOUNDATIONS FOR COMPUTING

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Assessment Title\ Number: SERIES TEST

1. *This examination has 4 Questions in Part A and 6 questions in Part B.*
2. Answer ***ALL*** questions from PART A and ***Three*** questions from PART B
3. Duration of Exam: 1.5 hours
4. Maximum Marks: 30

PART A **(4×3=12)**

1. Show that $(A \cup B)' = A' \cap B'$.
2. Let the relation R be defined on the set $A = \{1,2,3\}$ as $R = \{(1,2), (2,3), (3,3)\}$. Compute the reflexive, symmetric and transitive closures of R.
3. Using Euclidean algorithm, find GCD (143, 227).
4. Solve the recurrence relation $3a_{n+1} - 4a_n = 0, n \geq 0, a_1 = 5$.

PART B **(6×3=18)**

5. Let $f: R - \{2\} \to R - \{1\}$ defined by $f(x) = \frac{x+1}{x-2}$. Show that f is one-to-one and onto. Also find a formula for f^{-1}.

Or

6. Define an equivalence relation. Let R be a relation defined on a set of positive integers such that for $x, y \in Z$, xRy iff $5\ divides\ x - y$. Check whether R is an equivalence relation.

7. For any sets A, B, C, D, prove that $(i)\ (A \times B) \cap (C \times D) = (A \cap C) \times (B \cap D)$

$$(ii)\ A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$$

Or

8. (a) Write G.C.D. of 1769 and 2378 as a linear combination of the two numbers.
   (b) Show that 1! +2! +3! + …… + 100! gives a reminder 9, when divided by 12.

9. Solve the recurrence relation, $a_{n+2} - 8a_{n+1} + 16a_n = 8(5^n) + 6(4^n)$, $n \geq 0$.

Or

10. Solve the linear Diophantine equation $172x + 20y = 1000$.