Paper ID [B0104]

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MCA (Sem. - 1ˢᵗ)
COMPUTER MATHEMATICAL FOUNDATION
(MCA - 104)

Time : 03 Hours   **Maximum Marks : 60**

Instruction to Candidates:

   1)   Attempt any One question from each Sections - **A, B, C & D.**

   2)   Section - E is **Compulsory.**

Section - A

(1 x 10 = 10)

Q1) (a) Show that set of real numbers in [0, 1] is uncountable set.

   (b) Prove that $A \times (B \cap C) = (A \times B) \cap (A \times C)$

Q2) Let R = {(1,2), (2,3), (3,1)} and A = {1,2,3}. Find reflexive, symmetric and transitive closure of R using

   (a) Graphical Representation of R.

   (b) Composition of matrix relation R.

Section - B

(1 x 10 = 10)

Q3) Show that $\dfrac{1}{1.2} + \dfrac{1}{2.3} + \ldots\ldots + \dfrac{1}{n(n+1)} = \dfrac{n}{n+1}$ using mathematical induction.

Q4) Prove that following propositions are tautology

   (a) $\sim (p \wedge q) \vee q$

   (b) $p \Rightarrow (p \vee q)$

Section - C

Q5) Solve the following system of equations using matrix inversion method.

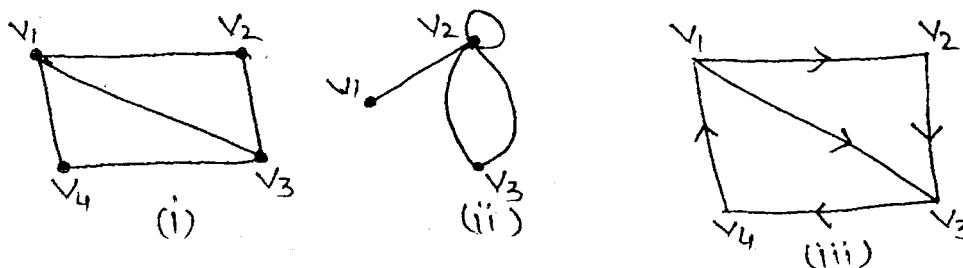$2x-y+3z = 8$, $-x+2y+z = 4$, $3x+y-4z = 0$

Q6) Find the rank of matrix.

$$A = \begin{bmatrix} 3 & -2 & 0 & -1 \\ 0 & 2 & 2 & 1 \\ 1 & -2 & -3 & 2 \\ 0 & 1 & 2 & 1 \end{bmatrix}$$

Section - D

Q7) A planar graph G is 5-colorable. Prove.

Q8) Using adjacency matrix represent the following graphs.

Section - E

Q9) a) Draw the truth table for $\sim (p \Rightarrow q) \equiv p \wedge \sim q$.

  b) Negate the statement for all real numbers x, if $x > 3$, then $x^2 > 9$

  c) Prove that $A-(B \cap C) = (A-B) \cup (A-C)$.

  d) Distinguish between ϕ, $\{\phi\}$, $\{0\}$ and 0.

  e) If $A_i = [0, i]$, where $i \in Z$, the set of integers, find

   (i) $A_1 \cup A_2$

   (ii) $\bigcup\limits_{i=5}^{10} A_i$