Paper ID [MC104]

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MCA (Sem. - 1st) MAY-2008

COMPUTER MATHEMATICAL FOUNDATION (MCA - 104) (N2)

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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 × 10 = 10)

Q1) Let R = {(1, 2), (2, 3), (3, 1)} and A = {1, 2, 3}, find the reflexive, symmetric and transitive closure of R, using.

   (a) Composition of relation R

   (b) Composition of matrix relation R

Q2) (a) Prove that $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$

   (b) Prove that $(A \cap B)' = A' \cup B'$

Section - B

(1 × 10 = 10)

Q3) Show that $p \Leftrightarrow q \equiv (p \vee q) \Rightarrow (p \wedge q)$ using

   (a) Truth Table (b) Algebra of propositions.

Q4) Prove by mathematical induction that $6^{n+2} + 7^{2n+1}$ is divisible by 43 for each positive integer 'n'.

Section - C

(1 × 10 = 10)

Q5) Find the rank of matrix A = $\begin{bmatrix} 1 & 2 & 3 & 0 \\ 2 & 4 & 3 & 2 \\ 3 & 2 & 1 & 3 \\ 6 & 8 & 7 & 5 \end{bmatrix}$.
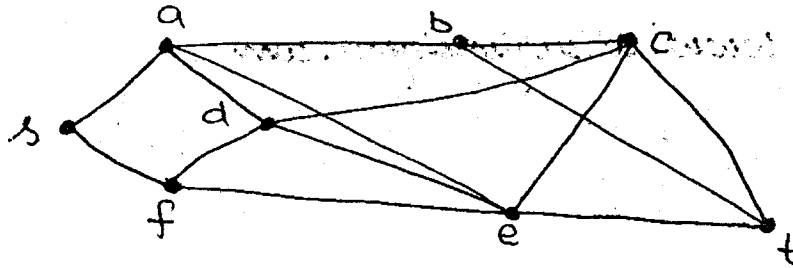
Q6) Solve the equations using matrix inversion method

$x+y+z=9, 2x+5y+7z=52, 2x+y-z=0$

Section - D

(1 × 10 = 10)

Q7) Find the shortest path from vertex s to t and its length from the graph given below.

Q8) A non empty connected graph G is Eulerian if and only if its vertices are all of even degree.

Section - E

Q9) a) Write the negation of each of the following conjunctions. *(10 × 2 = 20)*
   (i)   Paris is in France and London is in England.
   (ii) 2 + 4 = 6 and 7 < 12.

   b) Draw the truth table for $\sim(p \Leftrightarrow q) \equiv p \Leftrightarrow \sim q \equiv \sim p \Leftrightarrow q$.

   c) Draw the venn diagram for the following (i) $A - B$ (ii) $A \Delta B$.

   d) Prove that $(A \cap B) \times (C \cap D) = (A \times C) \cap (B \times D)$.

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

   f) Define Transpose of a matrix.

   g) Find the rank of a matrix, $A = \begin{bmatrix} 1 & 1 & -1 \\ 2 & -3 & 4 \\ 3 & -2 & 3 \end{bmatrix}$.

   h) Define Biparite Graph with example.

   i) Give an example of a graph which is Hamiltonian but not Eulerian.

   j) Draw the graph G corresponding to adjacency matrix. $A = \begin{bmatrix} 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 0 \\ 1 & 1 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix}$.

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