Seat No.

B.C.A. (Part - II) (Semester - IV) Examination, November. - 2017
COMPUTER MATHEMATICS
Mathematical Foundation (Paper -405)
Sub. Code : 63407

Day and Date : Friday, 10 - 11 - 2017   Total Marks : 80
Time : 02.30 p.m to 05.30 p.m.

Instructions :
1) Q.No.8 is compulsory.
2) Attempt any Four questions from Q.No.-1 to Q.No.-7.
3) Figures to the right indicate full marks.
4) Use of non programmable calculator is allowed

Q1) a) Define symmetric matrix. If $A = \begin{bmatrix} 2 & -1 \\ 3 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 11 \\ 14 \end{bmatrix}$ then find the matrix X such that $AX = B$.

b) There are 260 persons with a skin disorder. If 150 had been exposed to the chemical A, 74 to the chemical B, and 36 to both chemicals A and B. Find the number of persons exposed to (i) chemical A but not chemical B. (ii) chemical A or chemical B.   **[8 + 8]**

Q2) a) Define the term Contingency. Let P: He is tall and Q: He is handsome. Write each of the following Statement in symbolic form using p and q. (i) He is tall and handsome (ii) He is tall but not handsome.(iii) He is tall or he is short and handsome.

b) Define Diagonal matrix If $A = \begin{bmatrix} 4 & 1 \\ 5 & 2 \\ 3 & -4 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -6 & 4 \\ 2 & 0 & 3 \end{bmatrix}$ then find AB and

without computing the matrix BA show that $AB \neq BA$.   **[8 + 8]**

Q3) a) Define the terms : Finite set and Empty set. If A = {1,2,3,4,} B = {3,4,5,6}, C = {4,5,6,7,8} and universal set X = {1,2,3,4,5,6,7,8,9,10} then verify the following : (i) $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$ (ii) $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$ (iii) $A = (A \cap B) \cup (A \cap B')$, Where B' is complement of B.

b) Define the terms : Conjunction and Disjunction Using the truth table, prove the following equivalence $p \leftrightarrow q \equiv (p \to q) \wedge (q \to p)$ **[8 + 8]**

Q4) a) Define inverse of a matrix. Find inverse of matrix

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 1 & 5 \\ 2 & 4 & 7 \end{bmatrix}$$ by row transformation.

b) Define simple and compound statements. If p is true statement and q is false statement, then find truth value of $(p \to q) \leftrightarrow (\sim q \to \sim p)$ **[8 + 8]**

Q5) a) Define Simple graph and Multigraph. Give an example of each.

b) Define Singular and Nonsingular Matrices. If $A = \begin{bmatrix} 1 & 2 \\ 2 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 1 \\ 2 & 1 \end{bmatrix}$ then show that (i) AB is nonsingular matrix, (ii) $|A| \cdot |B| = |AB|$. **[8 + 8]**

Q6) a) Define the term Cartesian product. If A = {1,2,3}, B = {2,4} then find (i) A × B (ii) B × A (iii) (A × B) ∩ (B × A).

b) Define the terms : Bipartite graph and Complete bipartite graph. Draw a 3 - regular graph with eight vertices. **[8 + 8]**

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Q7) a) Define : Tautology and contradiction. Using truth table, Show that

$(p \wedge \sim q) \leftrightarrow (p \rightarrow q)$ is a contradiction.

b) Explain matrix representation of graph. Draw a multigraph corresponding

to adjacent matrix $A = \begin{bmatrix} 0 & 1 & 1 & 1 \\ 1 & 0 & 1 & 1 \\ 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 \end{bmatrix}$. **[8 + 8]**

Q8) a) Define Square matrix and Scalar matrix. If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ then show that

$A^2 - 4A$ is a scalar matrix.

b) Define Venn diagram. By Venn diagram shade the following sets
(i) $(A \cup B)'$ (ii) $A' \cup B'$. **[8 + 8]**