Seat No.

**B.C.A. (Faculty of Commerce) (Part - II) (Semester - IV) Examination, May - 2017**
**COMPUTER MATHEMATICS (Paper - 405)**
**Sub. Code : 63407**

**Day and Date : Saturday, 06 - 05 - 2017**
**Time : 3.00 p.m. to 6.00 p.m.**

**Total Marks : 80**

**Instructions :**
1) Question number Eight is compulsory.
2) Attempt any Four questions from the remaining questions.
3) Figures to the right indicate full marks.
4) Use of nonprogrammable calculator is allowed.

**Q1) a)** If $A = \begin{bmatrix} 1 & 2 \\ 2 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 1 \\ 2 & 1 \end{bmatrix}$ show that

i) $AB \neq BA$

ii) $(AB)' = B'A'$, where $A'$ is transpose of A.

**b)** Give meaning of Set. 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)** Symbolize the following statements:

i) He swims iff the water is warm.

ii) If water is warm then he swim.

iii) If water is not warm then he does not swim.

iv) He swims and water is warm.

**b)** Define the terms: Complete Graph and Regular Graph. Give an example of each.

[8 + 8]

*P.T.O.*

**Q3) a)** Define a determinant of order $3 \times 3$. Find the value of K, if the value of

$$\begin{vmatrix} 2 & -3 & -2 \\ 1 & 8 & 1 \\ 3 & -K & 5 \end{vmatrix} = 0.$$

**b)** Define the terms:

i) Finite set

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

**[8 + 8]**

**Q4) a)** Define Digraph and Weighted Graph. Draw a 3-regular graph with six vertices.

**b)** Define the term Tautology. Show that the statement pattern $(p \rightarrow q) \vee (q \rightarrow p)$ is a tautology.

**[8 + 8]**

**Q5) a)** Define cartesian product. If $A = \{a, b, c\}$, $B = \{x, y\}$, find

i) $A \times B$

ii) $A \times A$.

**b)** If $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 5 & 4 \\ 3 & 4 \end{bmatrix}$ then show that $(A + B)(A - B) \neq A^2 - B^2$.

**[8 + 8]**

**Q6) a)** Explain the term logical equivalence. Using truth table, prove that the statement $p \wedge q \equiv \sim (p \rightarrow \sim q)$ is logical equivalence.

**b)** **i)** Define power set. If {2, 3, 4}, then find the power set of A.

**ii)** By Venn diagram shade the following sets

1) $(A \cup B)'$

2) $(A - B) \cup (B - A)$

**[8 + 8]**

**Q7) a)** Define square matrix. If $A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$, find a matrix X such that AX = B.

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

to adjacent matrix $\begin{vmatrix} 0 & 1 & 1 & 1 \\ 1 & 0 & 1 & 1 \\ 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 \end{vmatrix}$.

**[8 + 8]**

**Q8) a)** Define Diagonal matrix. Show that the matrix $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ satisfy the equation $A^2 - 5A - 2I = 0$ and hence find $A^{-1}$, where I is unit matrix.

**b)** Determine the truth values of the following statements.

**i)** 2 + 2 = 7 if and only if 5 + 1 = 2

**ii)** It is not true that 1 + 1 = 2 iff 3 + 4 = 5

**iii)** London is in India or 3 + 1 = 4

**iv)** If 3 + 1 = 5 iff 3 + 4 < 6.

**[8 + 8]**