



Seat No.	
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SA - 532

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**B.C.A. (Part - II) (Semester - IV) Examination, May - 2019**

**COMPUTER**

**Mathematical Foundation (Paper - 405)**

Sub. Code : 63407

Day and Date : Monday, 13 - 05 - 2019

Total Marks : 80

Time : 2.30 p.m. to 05.30 p.m.

- Instructions :
- 1) Each question carry 16 marks.
  - 2) Solve any four questions from Q. 1 to Q.7.
  - 3) Q.8 is compulsory.

**Q1) a)** If p: It daytime, q: It is warm. [8]

Give the compound statement in verbal form denoted by.

- i)  $p \wedge \sim q$                       ii)  $p \rightarrow q$   
iii)  $p \vee q$                         iv)  $q \leftrightarrow p$

b) Define the terms: Tautology and contradiction. Give example of each. [8]

**Q2) a)** Define Cartesian Product. If  $A = \{1, 2, 3, 4\}$ ,  $B = \{4, 5\}$ , find [8]

- i)  $A \times B$                               ii)  $B \times A$   
iii)  $B \times B$

b) Give the meaning of conjunction and disjunction using truth table, Prove the following equivalence  $(p \wedge q) \equiv \sim (p \rightarrow \sim q)$  [8]

**Q3) a)** Define power set and obtain power set of  $A = \{3, 4, 5\}$ . Using venn diagram represent the following. [8]

- i)  $A \cup B$                               ii)  $A \cap B$

b) Define symmetric matrix. If  $A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$   $B = \begin{bmatrix} 2 & 3 & 4 \\ -1 & 0 & 5 \end{bmatrix}$  [8]

Verify : i)  $(A')' = A$

ii)  $(A+B)' = A'+B'$

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**Q4) a)** Define the terms: Weighted Graph and Bipartite graph. Give an example of each. [8]

b) Define the term: Matrix and Determinant. Find the value of x, if

$$\begin{vmatrix} 2 & 5 \\ x & 3x+1 \end{vmatrix} = 0$$

[8]

**Q5) a)** 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 chemical A and B. Find the number of persons exposed to [8]

i) Chemical A but not Chemical B

ii) Chemical A or Chemical B

b) Define the term path cycle in graph theory. Construct a graph of 2-regular graph on 6 vertices. [8]

**Q6) a)** Define inverse of matrix.  $A = \begin{bmatrix} 2 & 1 & 3 \\ 1 & 0 & 1 \\ 2 & 1 & 1 \end{bmatrix}$  exists and find its inverse. [8]

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

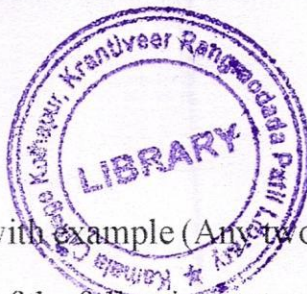
b) Test whether the following statement are true or false. [8]

i) There exists a 3-regular graph on nine vertices.

ii) Every closed walk is a cycle.

iii) In any complete graph  $K_n$ , number of edges is equal to  $\frac{n(n-1)}{2}$ .

iv) In any graph, the sum of the degrees of all the vertices is equal to twice the number of edges.



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Q7) a) Explain Graph operations with example (Any two operations) [8]

b) Determine the truth values of the following statements. [8]

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  $3 + 1 = 4$  then  $3 - 2 = 1$

Q8) a) Define the terms: Disjoint and Infinite set. [8]

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

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

iii)  $n(A \cup B) = n(A) + n(B) - n(A \cap B)$

b) Define: scalar matrix and Identity Matrix, If  $A = \begin{bmatrix} 1 & 2 \\ -3 & 0 \end{bmatrix}$  then find  $A^2 -$

$5A - 2I$  Where  $I$  is unit matrix.

[8]



