

Seat No.	
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B.C.A. (Part - II) (Semester - IV) Examination, May - 2018
MATHEMATICAL FOUNDATION (Paper - 405)
(Computer Mathematics)
Sub. Code : 63407

Day and Date : Friday, 04- 05 - 2018

Total Marks : 80

Time : 11.00 a.m. to 02.00 p.m.

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

Q1) a) Define : Square matrix and Identity Matrix. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ then show that $A^2 - 5A - 2I = 0$. Where I is unit matrix.

- b)** Define the terms : Infinite set and empty set. There are 260 persons with 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
- i) chemical A but not chemical B,
 - ii) chemical A or chemical B.

[16]

Q2) a) Give the meaning of conjunction and disjunction using truth table, prove the following equivalence.

$$p \leftrightarrow q \equiv (p \rightarrow q) \wedge (q \rightarrow p).$$

- b)** Define inverse of a matrix. Obtain the inverse of matrix $A = \begin{bmatrix} 2 & -3 & 3 \\ 2 & 2 & 3 \\ 3 & -2 & 2 \end{bmatrix}$ by using transformation method.

[16]

P.T.O.

- Q3)** a) Define the terms : Complete graph and Bi-partite graph. Give an example of each.
- b) Give the meaning of Tautology. Prove that the statement pattern $[p \wedge (p \rightarrow q)] \rightarrow a$ is a tautology.

[16]

- Q4)** a) Define cartesian product. If $A = \{a, b, c\}$, $B = \{x, y\}$, find

i) $A \times B$

ii) $B \times A$

iii) $B \times B$

- b) If $A = \begin{bmatrix} 1 & 2 \\ 2 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 1 \\ 2 & 1 \end{bmatrix}$ then show that

i) $AB \neq BA$

ii) $(AB)' = B'A'$, where A' and B' are the transform matrices of A and B respectively.

[16]

- Q5)** a) Let P : price increases q : demand falls. Express the following statements in the symbolic form using p and q.

i) Price increases, then demand falls

ii) Price increases iff the demand falls

iii) If demand does not fall, then price does not increase

iv) If price does not increase, then demand does not fall.

- b) Define the terms : Multigraph and pseudo graph. Draw a 3-regular graph with eight vertices.

[16]

Q6) a) Define complementary set and universal 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 :

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

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

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

b) State whether the following statements are true or false :

- In a simple graph with n vertices the degree of each vertex is at the most $n-1$.
- Every closed walk is a cycle.
- A circle with centre origin and radius four is a graph.
- In any graph, the sum of the degrees of all the vertices is always even.

[16]

Q7) a) Define Diagonal Matrix and give an example. If $A = \begin{bmatrix} 2 & -1 \\ 3 & 1 \end{bmatrix}$ and

$$B = \begin{bmatrix} 11 \\ 14 \end{bmatrix} \text{ then find the matrix } X \text{ such that } AX = B.$$

b) Define Disjoint sets with an illustration. By Venn diagram shade the following sets

$$i) (A \cup B)'$$

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

[16]

Q8) a) Define a determinant of order 3×3 . Find value of x , if $\begin{vmatrix} x & 3 & 3 \\ 3 & 3 & x \\ 2 & 3 & 3 \end{vmatrix} = 0$.

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

[16]

