

Seat No.	
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B.C.A. (Part - II) (Semester - IV) Examination, April - 2016

MATHEMATICS FOUNDATION

Computer Mathematics (Paper - 405)

Sub. Code: 63407

Day and Date : Saturday, 30 - 04 - 2016

Total Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

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

Q1) a) Define Diagonal matrix. If $A = \begin{bmatrix} 4 & -3 \\ 2 & 1 \end{bmatrix}$ then show that $A^2 - 5A + 10I = 0$.

Where I is unit matrix.

[8]

b) State Idempotent law and give an example of it. Let p : He is tall and q : he is handsome. Write each of the following statement in symbolic form using p and q .

[8]

- i) He is tall and handsome.
- ii) He is tall but not handsome.
- iii) He is tall or he is short and handsome.

Q2) 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 using

elementary transformation.

[8]

b) Define the terms: subset and finite 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

[8]

- i) $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$.
- ii) $(A \cup B)' = A' \cap B'$.

Q3) a) Define the terms: Digraph and pseudo graph. Give an example of each. [8]

b) Define the term contradiction. Using truth table show that the statement pattern $(p \wedge \sim q) \leftrightarrow (p \rightarrow q)$ is a contradiction. [8]

Q4) a) If $A = \begin{bmatrix} 1 & 2 \\ 0 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 1 \\ -1 & 0 \end{bmatrix}$ then test whether $(A + B)(A - B) = A^2 - B^2$ and verify that $|AB| = |A| \cdot |B|$. [8]

b) Define cartesian product. If $A = \{a, b, c\}$ and $B = \{x, y\}$, then find $A \times B$ and $B \times A$. [8]

Q5) a) Define a determinant of order 3×3 . Show that $\begin{vmatrix} 1 & a & -b \\ -a & 1 & c \\ b & -c & 1 \end{vmatrix} = 1 + a^2 + b^2 + c^2$. [8]

b) Define the terms: Complete graph and Bi-partite graph. Draw a 3 - regular graph with six vertices. [8]

Q6) a) From amongst 2000 literate individuals of a town, 70% read Marathi newspapers, 50% read English newspapers and 32.5% read both Marathi and English newspapers. Find the number of individuals who read [8]

- at least one of the newspapers,
- neither marathi nor English newspaper.

b) Explain logical equivalence. Using truth table, prove that the statement $p \wedge q \equiv \sim (p \rightarrow \sim q)$ is logical equivalence. [8]

Q7) a) Explain matrix representation of graph. Draw a multigraph corresponding

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

b) State De Morgan's laws (any two) and give an example of each. If $A = \{a, b, c\}$, write all possible subsets of A. [8]

Q8) a) Define scalar matrix and give an example of scalar 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 matrix AB and without computing the matrix BA show that $AB \neq BA$. [8]

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

i) $2 + 2 = 7$ if and only if $5 + 1 = 2$.

ii) If $3 + 1 = 4$ then $3 - 2 = 1$.

iii) It is not true that $1 + 1 = 2$ iff $3 + 4 = 5$.

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

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