B.C.A. (Part-I) (Semester-II) (CBCS)

Examination March/April, held in May, 2023.

AEC-312 -Mathematical Foundations for Computer Applications

Subject Code : 80872

Day and Date: Thursday, 01/06/2023   **Total Marks: 70**

Time: 10:30 a.m. to 01:30 p.m.

Instructions:
1. **Que 1 and Que 6 are compulsory.**
2. **Attempt any three questions from Que. 2 to Que. 5.**
3. **Figures to the right indicate full marks.**

Q.1) A] Select the correct alternative for the each of the following.   (10)

i) $(A \cup B) \cap (A \cup B')$ is equal to.......

a) $(A \cup B)$ b) $(A \cap B)$ c) A   d) B

ii) Let P : 7 is not greater than 4, and Q : Paris is in France Then $\sim (p \vee q)$ is the statement.

   a) 7 is greater than 4 or Paris is not in France.

   b) 7 is not greater than 4 and or Paris is not in France.

   c) 7 is not greater than 4 or Paris is not in France.

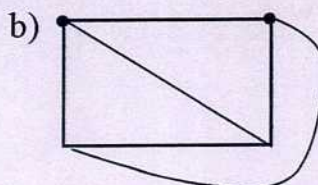   d) 7 is greater than 4 and Paris is not in France.
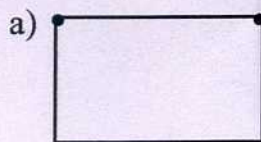
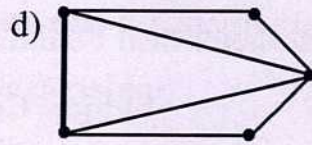iii) If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ then find $|A^T|$
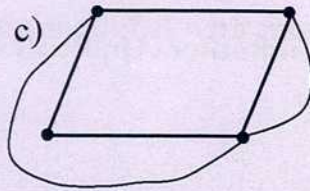
   a) 2   b) -2   c) 10   d) -10

iv) Number of edges in k_5 is ....

   a) 5   b) 10   c) 15   d) 25

v) Which of the following graphs is complete?

a)   b)

c)
d)

vi) If $A = \{2n \, / \, n \in N\}$ and $B = \{2^n \, / \, n \in N\}$

a) $A \subseteq B$
b) $B \subseteq A$

c) $A = B$
d) $n(A) = n(B)$

vii) Which one of the following is compound proposition?

a) It is raining
b) Sun is not shining

c) Rose are red
d) None of these

vii) The Value of $\begin{vmatrix} 1 & 0 & 2 \\ 2 & 1 & 1 \\ 1 & 2 & 3 \end{vmatrix}$

a) 1
b) 7
c) 9
d) 2

ix) The symbols $\wedge$, $\vee$, $\rightarrow$ and $\leftrightarrow$ are called......

a) Proposition
b) connectives

c) Statements
d) None of these

x) Let $A = \{a, b\}$ and $B = \{X, Y, Z\}$ then number of elements in A x B is...

a) 2
b) 3
c) 6
d) 5

B] Solve any Two of the following. (10)

i) Define disjoint sets with an illustration By Venn diagram shade the following sets

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

ii) Test Whether the following statements are true or false.

a) There exists a 3 regular graph on nine vertices

b) Every closed walk is a cycle

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

d) Every complete graph is regular

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

iii) If $A = \begin{bmatrix} 7 & 3 \\ 3 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} -5 & 3 \\ 3 & -7 \end{bmatrix}$ find $|A|$ and $|B|$, and show that AB is a non- singular matrix.

Que 2) a) Define inverse of a matrix. Show that the inverse of matrix, exists and find its inverse by elementary row transformation.

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

b) State De-Morgan's laws.

If p and q are true and r and s are false statements, find the truth value of the following statements.

i) $(p \vee q) \wedge r$

ii) $p \vee (r \rightarrow s)$

iii) $(p \wedge s) \leftrightarrow (q \vee r)$

iv) $\sim (p \vee \sim r) \wedge (\sim q \wedge r)$

(10)

Que 3) a) Define a finite set.

If A and B are subsets of the universal set x, and n (x) = 50, n (A) = 35,

n (B) = 20 and $n (A \cap B) = 10$ find

i) $n(A \cup B)$

ii) $n(A' \cap B')$

iii) $n(A' \cap B)$

iv) $n(A \cap B')$

b) What is a graph

Define the following terms with examples.

i) multigraph   ii) pseudograph   10

Que. 4) a) Define : Transpose of a matrix If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

$A^2 - 5A - 21 = 0$ Where I is unit matrix.

b) what is length of a string in computer representation of sets

Let U = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}

And A = {1, 3, 5, 7, 9}, B = {5, 6, 7, 8, 9}

And C = {1, 2, 3, 4, 5} What bit string represent.

  i) $A \cup B$ ii) C' iii) A – B iv) A⊕B   (10)

Que. 5) a) Define the terms path and cycle in graph theory. Construct a graph of 2 – regular graph on 6 vertices.

b) Define Tautology, Using truth table, examine whether the following statement pattern is tatutology, contradiction or contingency.

    $(p \wedge \sim q) \leftrightarrow (p \rightarrow q)$ (10)

Que 6) Write note on any Four of the following   20

    i) Degree of a vertex

    ii) Cartesian product

    iii) Converse, inverse and contrapositive of a conditional statement

    iv) any Five types of matrices

    v) matrix representation of graph

    vi) operations on sets.

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