| Seat No. | |
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**Total Pages: 04**

**Shivaji University, Kolhapur Examination, June 2022**

**Kamala College, Kolhapur**

**B.C.A (Part-I) (Semester – II)**

Mathematical Foundation for computer application.

Sub Code: 80872

Day and Date: Saturday, 02/07/2022 Total Marks: 70

Time: 10:30 am to 1 : 30 pm

**Instruction**

1) **Que. 1 and Que. 6 are compulsory.**
2) **Attempt any three Questions from Que. No. 2 to Que. No. 5**
3) **Figure to the right indicate 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.

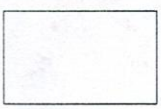
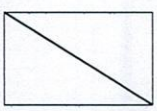
iii) If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and A. (adj A) = KI then the value of K is ....

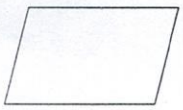
a) 2 b) -2 c) 10 d) -10

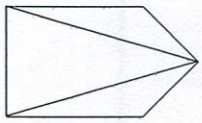
iv) Number of edges in k5 is .....

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 $B = \{2^n/n \in N\}$ then,

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

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

vii) Which one of the following is a compound proposition?

a) It is raining b) Sun is not shining

c) Roses are red c) None of these

viii) The value of $\begin{vmatrix} 1 & 0 & 2 \\ 2 & 1 & 1 \\ 1 & 2 & 3 \end{vmatrix}$ is....

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 $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ then show that

$A^2 - 5A - 2I = 0$ 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 tautology, contradiction or contingency. [10]

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

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.