C.U.SHAH UNIVERSITY
Summer Examination-2022

Subject Name : Mathematical Concepts for Computer Science

Subject Code : 4CS01BMA2   **Branch: B.C.A.**

Semester: 1   **Date: 22/04/2022**   **Time: 11:00 To 02:00**   **Marks: 70**

Instructions:
  (1) Use of Programmable calculator & any other electronic instrument is prohibited.
  (2) Instructions written on main answer book are strictly to be obeyed.
  (3) Draw neat diagrams and figures (if necessary) at right places.
  (4) Assume suitable data if needed.

Q-1   **Attempt the following questions:**   **(14)**

a) A _____ is an ordered collection of objects.
  A. Set   C. Relation
  B. Function   D. Proposition

b) What is the cardinality of the set A={1,2,3,4,5}?
  A. 10   C. 3
  B. 5   D. 20

c) Which of the following symbols represents "is an element of" ?
  A. $\subset$ C. $\in$
  B. $\subseteq$ D. None of the above

d) Which of the following sets are null sets?
  A. { }   C. ø
  B. Both (A) and (B)   D. {0}

e) If set A and set B are two disjoint sets then A$\cap$ B= _____
  A. A   C. ø
  B. B   D. A$\cup$B

f) The relation { (1,2), (1,3), (3,1), (1,1), (3,3), (3,2), (1,4), (4,2), (3,4)} is
  A. Reflexive   C. Symmetric
  B. Transitive   D. asymmetric

g) A function from A to B is called onto function if its range is
  A. A   C. Neither A nor B
  B. B   D. Both A and B

h) If domain of function f:x→x^2 + 1 is {0,1}, then its range is
  A. {0,1}   C. {1,2}
  B.   {2,3}   D. {3,4}

i) Transpose of a row matrix is
  A. zero matrix   C. Column matrix
  B. diagonal matrix   D. row matrix

j) What is the value of the limit $\lim_{x \to 1} \frac{x^2 - x - 2}{x^2 - 2x}$?

    A.-2   C. -1

    B.2   D. 1

k) If A is a symmetric matrix, then $A^T =$___

    A. A   C. |A|

    B. 0   D. Diagonal matrix

l) If the order of matrix A is m×p. And the order of B is p×n. Then the order of matrix AB is ?

    A. n × p   C. m × n

    B. p × n   D. n × m

m) The distance between the point P(1, 4) and Q(4, 0) is _____

    A. 4   C. 5

    B. 6   D. $3\sqrt{3}$

n) A(-2,5) can be plotted on _____ quadrant.

    A. first   C. third

    B. second   D. fourth

Attempt any four questions from Q-2 to Q-8

Q-2	**Attempt all questions**	**(14)**
a)	Let U={1,2,3,…,10}, A={1,3,5,7,9}, B={1,5,6,8}, C={1,4,6,7} then verify that	**(7)**
	(i) $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$	
	(ii) $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$	
b)	Let U={13,14,15,16,17,18,19,20,21,22,23}, A={13,14,15,16}, B={13,15,17,19}, C={16,17,18,20,22} then Write down the following sets : A', B', C', (A')', (B')', (A∪B)', (A∩B)', A'∪C'	**(7)**
Q-3	**Attempt all questions**	**(14)**
a)	Evaluate $\lim_{z \to 4} \frac{\sqrt{z} - 2}{z - 4}$, if it exists.	**(7)**
b)	Evaluate $\lim_{h \to 0} \frac{(6 + h)^2 - 36}{h}$, if it exists.	**(7)**
Q-4	**Attempt all questions**	**(14)**
a)	Explain symmetric and skew symmetric matrix with example.	**(5)**
b)	Explain representation of relation with example.	**(5)**
c)	Let A={1,2,3}, B={3,4} and C={1,4} then verify that $A \times (B - C) = (A \times B) - (A \times C)$	**(4)**
Q-5	**Attempt all questions**	**(14)**

a) (7)

If A = $\begin{bmatrix} 2 & -1 \\ 1 & 0 \\ -3 & 4 \end{bmatrix}$ and B = $\begin{bmatrix} 1 & -2 & -5 \\ 3 & 4 & 0 \end{bmatrix}$ then find AB and BA.

b) Prove that $A^3 - 3A^2 + 2A = 0$ (7)

If A = $\begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 1 \end{bmatrix}$

Q-6 **Attempt all questions** (14)
a) Prove that (2,3), (7,4), (8,7) and (3,6) are the vertices of a parallelogram. (7)
b) Prove that (0,-1), (3,5) and (5,9) are collinear points. (7)

Q-7 (14)

Explain following types of sets with example.
Empty set, infinite set, singleton set, subset, universal set, equal set, equivalent set

Q-8 **Attempt all questions** (14)
a) Explain surjective function, bijective function and injective function with example. (7)
b) (7)

Let A = $\begin{bmatrix} 2 & 1 & -1 \\ 1 & 0 & -1 \\ 1 & 1 & 2 \end{bmatrix}$ then find A^{-1}.