

C.U.SHAH UNIVERSITY

Winter Examination-2022

Subject Name : Mathematical Concepts for Computer Science

Subject Code : 4CS01BMA2

Branch: BCA

Semester: 1

Date: 03/01/2023

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) If $A = \{1, 2, 3, 4, 5\}$, then the number of proper subset of $A = \underline{\hspace{2cm}}$.

A. 31	C. 38
B. 48	D. 54
- b) What is the cardinality of the set of even positive integers less than 10?

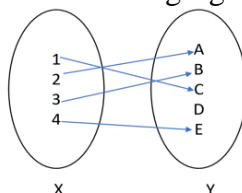
A. 10	C. 3
B. 5	D. 20
- c) Which of the following symbols represents “is an element of”?

A. \subset	C. \in
B. \subseteq	D. None of the above
- d) Which of the following sets are null sets?

A. $\{ \}$	C. \emptyset
B. Both (A) and (B)	D. $\{0\}$
- e) Which of the following is correct for $A - B = \underline{\hspace{2cm}}$

A. $A \cap B$	C. $A' \cap B$
B. $A \cap B'$	D. $A' \cap B'$
- f) The relation $\{(1, 2), (2, 1), (1, 5), (5, 1), (2, 4), (4, 2)\}$ is

A. Reflexive	C. Symmetric
B. Transitive	D. asymmetric
- g) The following figure displays which type of function?



- | | |
|------------|--------------------------|
| A. one-one | C. many-one |
| B. onto | D. Both one-one and onto |
- h) If domain of function $f: x \rightarrow x^2 + 1$ is $\{0, 1\}$, then its range is

A. $\{0, 1\}$	C. $\{1, 2\}$
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- 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 $\lim_{x \rightarrow 1} \frac{x^2 - x - 2}{x^2 - 2x}$?
 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 $m \times p$. And the order of B is $p \times n$. Then the order of matrix AB is ?
 A. $n \times p$ C. $m \times n$
 B. $p \times n$ D. $n \times m$
- m) Find the value of k if the points A(2, 3), B(4, k) and C(6, -3) are collinear.
 A. 2 C. 3
 B. 0 D. 1
- 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 $U = \{1, 2, 3, \dots, 10\}$, $A = \{1, 3, 5, 7, 9\}$, $B = \{1, 5, 6, 8\}$, $C = \{1, 4, 6, 7\}$ then verify that (5)
 (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) Explain representation of relation with example. (5)
- c) Explain representation of sets with example. (4)

Q-3 Attempt all questions (14)

- a) Explain symmetric difference of two sets with example and venn diagram. (5)
- b) In a class of 60 students, 35 plays kabbadi and 40 plays khokho and 20 plays both. (5)
 Find the number of students who play neither of these games.
- c) Let $A = \{1, 2, 3\}$, $B = \{3, 4\}$ and $C = \{1, 4\}$ then verify that (4)
 $A \times (B - C) = (A \times B) - (A \times C)$

Q-4 (14)

Empty set, infinite set, singleton set, subset, universal set, equal set, equivalent set



Q-5

Attempt all questions

(14)

a)

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

(5)

b)

$$\text{Let } A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix} \text{ then prove that } A^2 - 5A + 7I = 0$$

(5)

c) Find the value of a, b, c, x, y, z from the following matrices

(4)

$$\begin{bmatrix} a+1 & b+2 & 3+z \\ -5 & c-7 & 0 \\ x+6 & y+4 & 1 \end{bmatrix} = \begin{bmatrix} 2a+5 & 7 & 2z-5 \\ -5 & 0 & x \\ 6 & 5 & 1 \end{bmatrix}$$

Q-6

Attempt all questions

(14)

a) Prove that (2,3), (7,4), (8,7) and (3,6) are the vertices of a parallelogram.

(5)

b) Prove that (0,-1), (3,5) and (5,9) are collinear points.

(5)

c) Find a point which divides the line joining A(5,13) and B(1,4) in the ratio of 2:3.

(4)

Q-7

Attempt all questions

(14)

a) Explain surjective function, bijective function and injective function with example.

(5)

b) Explain reflexive relation, symmetric relation and transitive relation with example.

(5)

c)

Evaluate $\lim_{x \rightarrow 5} \frac{\sqrt{x^2 + 11} - 6}{x - 5}$

(4)

Q-8

Attempt all questions

(14)

a) Prove De Morgan's laws.

(7)

b)

(7)

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

