

C.U.SHAH UNIVERSITY

Summer Examination-2019

Subject Name : Mathematical Concepts for Computer Science

Subject Code : 4CS01BMA2

Branch: B.C.A.

Semester :1 Date : 14/03/2019

Time : 02:30 To 05:30

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) What is set?
- (b) The set O of odd positive integers less than 10 can be expressed by _____
- (c) Power set of empty set has exactly _____ subset.
- (d) If set A and set B are two disjoint sets then $A \cap B =$ _____
- (e) How many elements are in power set of a set of order n ?
- (f) The relation $\{ (1,2), (1,3), (3,1), (1,1), (3,3), (2,3), (2,1) \}$ is _____ relation.
- (g) If domain of function $f: x \rightarrow x^2 + 1$ is $\{0,1\}$, then its range is _____
- (h) Define : Rectangular matrix
- (i) Define : row matrix
- (j) If A is a symmetric matrix, then $A^T =$ _____
- (k) If the order of matrix A is $m \times n$. And the order of B is $n \times p$. Then the order of matrix AB is ?
- (l) What is equivalence relation ?
- (m) A(5,5) can be plotted on _____ quadrant.
- (n) What is the distance between points A(4,0) and B(0,3) ?

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

Q-2 Explain following types of sets with example. (14)

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

Q-3 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 (5)

verify that,

(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 and prove De Morgan's law. (5)

(c) If $A = \{a, b, c\}$, $B = \{a, b\}$ find $A \times B$, $B \times A$ (4)

Q-4 Attempt all questions (14)

(a) Explain reflexive, symmetric, transitive relation with example. (5)

(b) Explain surjective, bijective, injective function with example. (5)

(c) Let $A = \{a, b, c\}$, $B = \{1, 2\}$, $C = \{a, b, g\}$ are being three sets and $R = \{(a, 1), (a, 2), (b, 2), (c, 1)\}$, $S = \{(1, a), (2, b), (2, g)\}$ be two relations then find $S \circ R$. (4)

Q-5 Attempt all questions (14)

(a) Prove that $(-2, -2)$, $(-1, 2)$ and $(3, 1)$ are the vertices of an isosceles triangle. (5)

(b) Find the area of triangle whose vertices are $(2, 3)$, $(8, 5)$ and $(4, 7)$. (5)

(c) Prove that $(0, -2)$, $(2, 4)$ and $(-1, -5)$ are collinear points (4)

Q-6 Attempt all questions (14)

(a) If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 6 & 7 \\ 8 & 9 \end{bmatrix}$ then find AB and BA (5)

(b) Prove that $A + A^T$ is a symmetric matrix if (5)

$$A = \begin{bmatrix} 4 & 1 & 3 \\ 2 & 0 & 5 \\ 1 & 3 & 0 \end{bmatrix}$$

(c) Find the determinant of matrix if (4)

$$A = \begin{bmatrix} 6 & 1 & 1 \\ 4 & -2 & 5 \\ 2 & 8 & 7 \end{bmatrix}$$

Q-7 Attempt all questions (14)

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

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



(b) If $A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 4 & 5 \\ 1 & 0 & 6 \end{bmatrix}$ then find A^{-1} . (7)

Q-8 Attempt all questions (14)

(a) Evaluate $\lim_{z \rightarrow 4} \frac{\sqrt{z} - 2}{z - 4}$, if it exists. (5)

(b) Evaluate $\lim_{h \rightarrow 0} \frac{(6 + h)^2 - 36}{h}$, if it exists. (5)

(c) Evaluate $\lim_{x \rightarrow -5} \frac{x^2 - 25}{-5x^2 + 2x - 15}$, if it exists. (4)

