

Enrollment No: _____

Exam Seat No: _____

C.U.SHAH UNIVERSITY

Summer Examination-2018

Subject Name: Mathematical Concepts for Computer Science

Subject Code: 4CS01IFM2

Branch: B.Sc. I.T.

Semester: 1

Date: 27/03/2018

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) If two sets A and B then A is subset of B is denoted by
a) $A \cap B$ b) $A \cup B$ c) $A \subset B$ d) $A \supset B$
- b) If $A = \{2, 4, 5, 7\}$ and $B = \{1, 3, 5, 7\}$ then $A \cap B =$ _____.
a) $\{2, 4\}$ b) ϕ c) $\{5, 7\}$ d) $\{1, 2, 3, 4, 5, 7\}$
- c) Relation $R = \{(a, a), (b, b), (c, c)\}$ is _____ on $A = \{a, b, c\}$.
a) symmetric b) reflexive c) transitive d) all of these
- d) Relation $R = \{(C, D) / C \subseteq D\}$ is anti-symmetric on $A = P(X)$. - True or False?
- e) If $n(A) = 2$ and $n(B) = 3$ then $n(A \times B) =$ _____.
a) 3 b) 6 c) 9 d) none of these
- f) If $A = \begin{bmatrix} 1 & 2 \\ 1 & 0 \end{bmatrix}$ then $\det(A) =$ _____.
a) 2 b) -2 c) 0 d) none of these
- g) $f(x) = x$ is an even function. - True or False?
- h) If $f(x) = x^2 + x + 1$ then $f(-2) =$ _____.
a) 2 b) -2 c) 3 d) none of these
- i) If $A = \begin{bmatrix} 1 & 0 \\ 0 & 2 \end{bmatrix}$ is a square matrix then $\text{adj}A =$ _____.
a) $\begin{bmatrix} 1 & 0 \\ 0 & 2 \end{bmatrix}$ b) $\begin{bmatrix} -1 & 0 \\ 0 & -2 \end{bmatrix}$ c) $\begin{bmatrix} 2 & 0 \\ 0 & 1 \end{bmatrix}$ d) none of these



- j) Point $(2,3)$ is in the _____ quadrant.
 a) first b) second c) third d) fourth
- k) If two straight lines $y = m_1x + c$ & $y = m_2x + c$ are perpendicular then $m_1m_2 = \underline{\hspace{2cm}}$
 a) 2 b) 0 c) 1 d) -1
- l) $\lim_{x \rightarrow 0} \frac{\sin x}{x} = \underline{\hspace{2cm}}$.
 a) x b) 1 c) 0 d) none of these
- m) $\lim_{x \rightarrow 1} \frac{x^2 + 2x + 1}{x + 1} = \underline{\hspace{2cm}}$.
 a) 2 b) 0 c) 1 d) -1
- n) Define: Limit

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

Q-2 Attempt all questions

- a) If $A = \{1, 2, 3, 5\}; B = \{2, 3, 5\}; C = \{1, 2, 4\}$ then verify that (05)
 i) $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$ ii) $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$
- b) If $U = \{x / x \in N, x \leq 6\}, A = \{x / x \in N \text{ \& } x \text{ is odd number, } x \leq 6\}$ and (05)
 $B = \{x / x \in N \text{ \& } x \text{ is even number, } x \leq 6\}$ then prove that
 i) $(A \cap B)' = A' \cup B'$ ii) $(A \cup B)' = A' \cap B'$
- c) If $A = \{a, b, c, d, e, f\}, B = \{a, e, f, m, n\}$ and $C = \{b, e, m, n\}$ then find (04)
 i) $A \cup B \cup C$ ii) $A \cap (B \cup C)$ iii) $A \cap B \cap C$ iv) $A - B$

Q-3 Attempt all questions

- a) If $A = \begin{bmatrix} -1 & 0 \\ 2 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 1 \\ 0 & 3 \end{bmatrix}$ are two matrices then verify that $(AB)^T = B^T A^T$. (05)
- b) Find the inverse of the matrix $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$. (05)
- c) If $A = \begin{bmatrix} 1 & -1 \\ -2 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -3 \\ 0 & 2 \end{bmatrix}$ then find matrix $3A + B$ and $A - 4B$. (04)

Q-4 Attempt all questions

- a) Find the equation of a line passing through $(-2, 3)$ and perpendicular to the line joining the $(1, 7)$ and $(-2, -5)$. (05)
- b) Prove that $(-3, 2), (1, 2)$ and $(-3, 5)$ are the vertices of a right angled triangle. (05)



- c) Find the area of a triangle formed by the points $(-3,0), (2,8), (5,1)$. (04)

Q-5 Attempt all questions

- a) It is observed that a quadratic function fits the data points $(1,9), (2,14), (3,23)$. (05)
Find the quadratic function and estimate y when $x = 4$.

- b) If $f(x) = \log x$ then prove that (05)

i) $f(x) + f(y) = f(xy)$ and ii) $f(x) - f(y) = f\left(\frac{x}{y}\right)$.

- c) Write domain and range of the following functions (04)

i) $f : A \rightarrow B$ is defined by $f(x) = 5x + 2$, where $A = \{x | x \in N, 1 \leq x \leq 4\}$

ii) $g : N \rightarrow N$ is defined by $f(x) = x^2 - x$, where $x < 5$

Q-6 Attempt all questions

- a) Prove that $\langle P(X), \subseteq \rangle$ is an equivalence relation. Where X be a non-empty set. (05)

- b) Let $A = \{1, 2, 3\}$ and $B = \{1, 2, 3, 4\}$. The relations $R_1 = \{(1,1), (2,1), (2,2), (3,3)\}$ and $R_2 = \{(1,1), (1,2), (2,3), (2,1)\}$ then find $R_1 \cup R_2, R_1 \cap R_2, R_1 - R_2$ and $R_2 - R_1$. (05)

- c) Draw the directed graph that represents the relation $R = \{(a,b), (b,b), (b,c), (c,b), (d,c), (a,d), (d,b)\}$. (04)

Q-7 Attempt all questions

- a) Discuss the continuity at $x = 2$, where $f(x) = \begin{cases} x^2 - 4, & 0 \leq x < 2 \\ \frac{3x-2}{x}, & x > 2 \\ 2 & x = 2 \end{cases}$. (05)

- b) Evaluate: $\lim_{x \rightarrow 0} \frac{e^x - 1 - x}{x^2}$ (05)

- c) Evaluate: $\lim_{x \rightarrow 2} \frac{x^4 - 16}{x^3 - 8}$ (04)

Q-8 Attempt all questions

- a) If $A = \{a, b, c\}; B = \{b, c\}; C = \{a, c\}$, prove that $A \times (B - C) = (A \times B) - (A \times C)$. (05)

- b) Solve the equations $2x + 3y = 5$ and $5x - 4y = 1$ by using matrix method. (05)

- c) Find the equation of a line joining points $A(3, -5)$ and $B(-6, 4)$. (04)

