Enrollment No: _____   Exam Seat No:_____

C.U.SHAH UNIVERSITY
Winter Examination-2020

Subject Name: Fundamental Mathematics for Computer

Subject Code: 4CS01BMT1   **Branch: BCA**

Semester: 1   **Date: 12/03/2021**   **Time: 03:00 To 06:00**   **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) Intersection of two sets A and 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) If $A = \begin{bmatrix} 1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$ then $AB =$ _____.
    a) $\begin{bmatrix} 1 & 1 \end{bmatrix}$ b) $\begin{bmatrix} 0 & 0 \end{bmatrix}$ c) $\begin{bmatrix} 3 \end{bmatrix}$ d) $\begin{bmatrix} 1 \end{bmatrix}$

d) If $A = \begin{bmatrix} 1 & 0 \\ 0 & 2 \end{bmatrix}$ is a square matrix then $adjA$ _____.
    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

e) Point _____ is in the first quadrant.
    a) $(2,1)$ b) $(3,-1)$ c) $(-1,-4)$ d) $(-2,5)$

f) If two straight lines $y = m_1 x + c$ & $y = m_2 x + c$ are perpendicular then _____.
    a) $m_1 = m_2$ b) $m_1 = -m_2$ c) $m_1 m_2 = 1$ d) $m_1 m_2 = -1$

g) If $\theta = \dfrac{\pi}{2}$ then the value of $\cos \theta =$ _____.
    a) -1   b) 0   c) 1   d) none of these

h) $\sin^2 \theta + \cos^2 \theta =$ _____.
    a) -1   b) 0   c) 1   d) none of these

i) $\dfrac{d}{dx}(\log x) = $ _____.

     a) x b) $\log x$ c) $1+\log x$ d) $\dfrac{1}{x}$

j) $\dfrac{d}{dx}(e^x) = $ _____.

     a) e^x b) $2e^{2x}$ c) $\dfrac{e^x}{2}$ d) none of these

k) $\dfrac{d}{dx}(8) = $ _____.

     a) 2^3 b) 1 c) 0 d) none of these

l) $\displaystyle\int 2\,dx = $ _____.

     a) $2x+c$ b) 2 c) 0 d) none of these

m) $\displaystyle\int \sin x\,dx = $ _____.

     a) $\cos x+c$ b) $\sin x+c$ c) $-\cos x+c$ d) $-\sin x+c$

n) $\displaystyle\int 1\,dx = $ _____.

     a) $x+c$ b) $\dfrac{x^2}{2}+c$ c) 1 d) $\dfrac{1}{x}+c$

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

Q-2 Attempt all questions

a) If $A=\{1,2,4,5\};B=\{2,3,4\};C=\{1,2,3\}$ 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) **(05)**

If $U=\{a,b,c,d,e,f,g,h\}, A=\{a,b,c,f,g\}$ and $B=\{c,d,e,g,h\}$ then prove that

     i) $(A\cap B)' = A'\cup B'$ ii) $(A\cup B)' = A'\cap B'$

c) If $A=\{2,4,6,8\}, B=\{1,3,5,7\}$ and $C=\{2,3,6,7\}$ 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) Find the inverse of the matrix $A=\begin{bmatrix} 3 & -1 & 2 \\ 4 & 1 & -1 \\ 5 & 0 & 1 \end{bmatrix}$.   **(05)**

b) If $A=\begin{bmatrix} 2 & 3 \\ 1 & 4 \end{bmatrix}$ and $B=\begin{bmatrix} 5 & 1 \\ 0 & 3 \end{bmatrix}$ are two matrices then verify that $(AB)^T = B^T A^T$ **(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 $(5,7)$ and perpendicular to the line $2x + 3y + 5 = 0$. **(05)**

b) Prove that $(6,6), (2,3)$ and $(4,7)$ are the vertices of a right angled triangle. **(05)**

c) Find the co-ordinates of a point which divides the line joining the points **(04)**
$(1,-2)$ and $(4,7)$ in the ratio 2:5.

Q-5 Attempt all questions

a) Prove that $(\sin\theta + \cos\theta)^2 + (\cos\theta - \sin\theta)^2 = 2$. **(05)**

b) Draw the graph of $y = \sin x$, $0 \le x \le \pi$. **(05)**

c) Evaluate the following: **(04)**
1.) $\sin^2 30° + \cos^2 45° - \cos ec^2 60°$ 2.) $\sec^2 660° - \sin^2 30°$

Q-6 Attempt all questions

a) Find the differentiation of $\dfrac{x^2 + 3x + 1}{x + 1}$ with respect to x. **(05)**

b) Find: $\dfrac{d}{dx}\left(\log\left(x^2 + 3x\right)\right)$ **(05)**

c) If $x = at^2$ & $y = 2at$ then find $\dfrac{dy}{dx}$. **(04)**

Q-7 Attempt all questions

a) Evaluate $\int (x^2 + 1) e^x \, dx$ by method of integration by parts. **(05)**

b) Find: $\int \dfrac{(\log x)^2}{x} \, dx$ **(05)**

c) Find: $\int (4x - 3)^2 \, dx$ **(04)**

Q-8 Attempt all questions

a) If $A = \{1,2\}; B = \{2,3\}; C = \{1,3\}$, prove that $A \times (B - C) = (A \times B) - (A \times C)$. **(05)**

b) Find the equation of line passing through the point $(1,-2)$ and perpendicular to **(05)**
the line passing through the points $(-1,1)$ and $(-2,-3)$.

c) Solve the equations $2x - y = 4$ and $3x + y = 1$ by using matrix method. **(04)**