C.U.SHAH UNIVERSITY
Winter Examination-2018

Subject Name : Fundamental Mathematics for Computer

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

Semester : 1　　　　　**Date : 03/12/2018**　　　　　**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 $A \subset B$ then _____.

　　a) $A \supset B$　　　　b) $A \cap B = A$　　　c) $A \cap B = B$　　　d) All of these

b) If $A = \{1,2,3,4\}$ and $B = \{1,3,5\}$ then $n(B) = $ _____.

　　a) $\{2,4\}$　　b) 4　　　c) $\{5,7\}$　　d) 2

c) If $A = \begin{bmatrix} -1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$ then $AB = $ _____.

　　a) $\begin{bmatrix} -1 & 4 \end{bmatrix}$　　b) $\begin{bmatrix} 1 & 1 \end{bmatrix}$　　c) $\begin{bmatrix} 3 \end{bmatrix}$　　d) $\begin{bmatrix} 1 \end{bmatrix}$

d) If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ is a square matrix then $A^T = $ _____.

　　a) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$　　　b) $\begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$　　　c) -2　　d) 2

e) Point $(-2,-2)$ is in the _____ quadrant.

　　a) first　　　　b) seccond　　　c) third　　　d) fourth

f) If two straight lines $y = m_1 x + c$ & $y = m_2 x + c$ are perpendicular then $m_1 m_2 = $ ____

　　a) 2　　b) 0　　　c) 1　　d) -1

g) If $\theta = \pi$ then the value of $\sin\theta + \cos\theta = $ _____.

　　a) 2　　b) 0　　　c) 1　　d) -1

h) $\sin^2\theta + \cos^2\theta = $ _____.

　　a) -1　　b) 0　　　c) 1　　d) none of these

i) 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

j) $\dfrac{d}{dx}(x^2) =$ _____ .

     a) $2x$ b) x^2 c) $\dfrac{x^3}{3}$ d) none of these

k) $\dfrac{d}{dx}(C) =$ _____ , where C is constant.

     a) C b) 1   c) 0   d) none of these

l) $\int \cos x \, dx =$ _____ .

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

m) $\int 1 \, dx =$ _____ .

     a) $x + c$ b) 1   c) 0   d) none of these

n) $\int e^{2x} \, dx =$ _____ .

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

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

Q-2   **Attempt all questions**   **(14)**

     a) If $A = \{1,2,3,5\}; B = \{2,4,6\}; C = \{1,3,4\}$ 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 $U = \{a,b,c,d,e,f,g,h\}, A = \{a,b,e,f,g\}$ and $B = \{c,d,e,g,h\}$ then prove that   **(05)**

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

     c) If $A = \{a,b,c,e,f\}, B = \{a,d,e,f,m,n\}$ 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**   **(14)**

     a) If $A = \begin{bmatrix} 3 & 1 \\ -2 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & -2 \\ 1 & 3 \end{bmatrix}$ are two matrices then verify that $(AB)^T = B^T A^T$.   **(05)**

     b) Find the inverse of the matrix $A = \begin{bmatrix} 3 & -1 & 2 \\ 4 & 1 & -1 \\ 5 & 0 & 1 \end{bmatrix}$.   **(05)**

c) If $A = \begin{bmatrix} 1 & -3 \\ 2 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 0 \\ 3 & -2 \end{bmatrix}$ then find matrix $4A - 3B$ and $A + 2B$. (04)

Q-4   **Attempt all questions**   (14)

a) Find the equation of a line passing through $(1,3)$ and $(2,5)$. (05)

b) 1.) Find the area of a triangle formed by the points $(2,3),(5,8),(7,4)$. (05)

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

c) Prove that $(0,4),(0,0)$ and $(3,0)$ are the vertices of a right angled triangle. (04)

Q-5   **Attempt all questions**   (14)

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

b) Draw the graph of $y = \sin 2x, \quad 0 \le x \le \dfrac{\pi}{2}$. (05)

c) Prove that $\sin^2\dfrac{\pi}{4} + \sin^2\dfrac{3\pi}{4} + \sin^2\dfrac{5\pi}{4} + \sin^2\dfrac{7\pi}{4} = 2$. (04)

Q-6   **Attempt all questions**   (14)

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

b) Find: $\dfrac{d}{dx}\left(\log\left(\dfrac{1+\sin x}{\cos x} \right) \right)$ (05)

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

Q-7   **Attempt all questions**   (14)

a) Evaluate $\int x^2 \sin x\, dx$ by method of integration by parts. (05)

b) Find: $\int (\sin x)^4 \cos x\, dx$ (05)

c) Find: $\int (x^2+1)^3 dx$ (04)

Q-8   **Attempt all questions**   (14)

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

b) Obtain the equation of a line passing through $(1,2)$ and the point of intersection of the lines $4x + 5y + 6 = 0$ and $3x - 2y - 7 = 0$. (05)

c) Solve the equations $3x + 4y = 6$ and $5x + 3y = -1$ by using matrix method. (04)