C.U.SHAH UNIVERSITY
Summer Examination-2019

Subject Name : Basic Mathematics
Subject Code : 2TE01BMT2   **Branch: Diploma (All)**
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) The distance between the points (2, 3) and (3, 4) is _____.
    (A) $\sqrt{2}$ (B) $2\sqrt{2}$ (C) 25   (D) None of these

  b) Midpoint of $(-7,2)$ and $(3,8)$ is _____.
    (A) $(2,5)$ (B) $(2,-5)$ (C) $(-2,5)$ (D) $(-2,-5)$

  c) $x-$ intercept of line $3x+2y-7=0$ is _____.
    (A) $7/2$ (B) $-7/2$ (C) $7/3$ (D) $-7/3$

  d) Centre of the circle $2x^2+2y^2=5$ is _____ .
    (A) $(0,0)$ (B) $(5,0)$ (C) $(0,5)$ (D) $(5/2,5/2)$

  e) If $A=\begin{bmatrix}1 & 2\\3 & 4\end{bmatrix}$ then $A^T =$ _____.

    (A) $\begin{bmatrix}1 & -2\\-3 & 4\end{bmatrix}$ (B) $\begin{bmatrix}-1 & 3\\2 & -4\end{bmatrix}$ (C) $\begin{bmatrix}4 & 3\\2 & 1\end{bmatrix}$ (D) $\begin{bmatrix}1 & 3\\2 & 4\end{bmatrix}$

  f) If $\begin{vmatrix}x & -2\\3 & -5\end{vmatrix}=-4$ then $x=$ _____.
    (A) $-2/5$ (B) $2/5$ (C) -2 (D) 2

  g) Order of matrix $\begin{bmatrix}1 & 2 & 5\\2 & 3 & 7\end{bmatrix}$ is = _____.
    (A) 2×3 (B) 3×2 (C) 2×2 (D) None of these

  h) If $A=\begin{bmatrix}-7 & 6\\5 & -2\end{bmatrix}$ then $AI=$ _____.

    (A) $\begin{bmatrix}-7 & 6\\5 & -2\end{bmatrix}$ (B) $\begin{bmatrix}7 & -6\\-5 & 2\end{bmatrix}$ (C) $\begin{bmatrix}7 & 6\\5 & 2\end{bmatrix}$ (D) None of these

  i) Number of terms in the expansion of $\left(\sqrt{x}+\dfrac{2}{x}\right)^8 =$ _____.
    (A) 7   (B) 8   (C) 9   (D) none of these

j) $14C_{12}$ = _____

(A) 156 (B) 19 (C) 91 (D) None of these

k) $\dfrac{\pi}{12}$ = _____ °

(A) $15°$ (B) $12°$ (C) $25°$ (D) $10°$

l) $45°$ = _____ Radian

(A) $\dfrac{\pi}{6}$ (B) $\dfrac{\pi}{3}$ (C) $\dfrac{\pi}{2}$ (D) $\dfrac{\pi}{4}$

m) $\cos ec^2\theta - \cot^2\theta$ = _____

(A) -1 (B) 0 (C) 1 (D) None of these

n) $\tan\left(\dfrac{21\pi}{4}\right)$ = _____

(A) $\dfrac{-1}{\sqrt{3}}$ (B) $\dfrac{1}{\sqrt{3}}$ (C) 1 (D) $\sqrt{3}$

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

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

a) A(-1, 3), B(-1, x) and C(4, 3) are vertices of a triangle. If m∠B = 90° (5)
then find value of x.

b) Find centre and radius of circle $2x^2 + 2y^2 - 8x + 4y + 2 = 0$. (5)

c) Find the 4$^{\text{th}}$ term of $\left(\dfrac{x}{a} - \dfrac{a}{x}\right)^{10}$. (4)

Q-3   **Attempt all questions**   (14)

a) If $A = \begin{bmatrix} 2 & 3 \\ 0 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 3 & 4 \\ 2 & 1 \end{bmatrix}$ then prove that $(AB)^T = B^T A^T$. (5)

b) For matrices $A = \begin{bmatrix} 1 & 2 & 0 \\ 1 & 1 & 0 \\ -1 & 4 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 1 & -1 \\ 2 & 2 & 2 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 1 & -1 \\ 1 & 1 & 1 \end{bmatrix}$ (5)

then show that $AB = AC$.

c) If the centroid of a triangle whose vertices are (-2, 3), (a, 5) and (-1, b) (4)
is (5, 5) then find the values of a and b.

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

a) Find the coefficient of x^{-3} in the expansion of $\left(\dfrac{4x}{5} + \dfrac{5}{2x}\right)^9$. (5)

b) Using binomial theorem, find the approximate value of $\dfrac{1}{\sqrt[3]{997}}$ and $(101)^{\frac{3}{2}}$. (5)

c) If $A = \begin{bmatrix} 2 & 3 & 6 \\ -1 & 2 & 5 \end{bmatrix}$, $B = \begin{bmatrix} 0 & 2 & -8 \\ 2 & 4 & -2 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & 3 & -3 \\ 1 & 4 & 1 \end{bmatrix}$ then prove (4)

that $2A + 3B - 4C = 0$.

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

a) Find the equation of perpendicular bisector to line joining points (-1, 2) and (5)

$(1, -2)$.

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

c) If $A = \begin{bmatrix} 1 & 2 & 1 \\ 3 & 4 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 3 & -2 & 4 \\ 1 & 5 & 0 \end{bmatrix}$ then find matrix X from $X + A + B = 0$. **(4)**

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

a) Solve the following equations by matrix method: **(5)**
$5x + 3y = 11$ and $3x - 2y = -1$

b) Draw the graph of $y = \sin x$ $\left(-\dfrac{\pi}{2} \le x \le \dfrac{\pi}{2} \right)$. **(5)**

c) Evaluate: $\tan\left(2\tan^{-1}\dfrac{1}{3} \right)$ **(4)**

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

a) In which ratio $X -$ axis divides line segment joining points (2, 2) and **(5)**
$(-3, 6)$? Find coordinates of division point.

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

c) Prove that $\tan 62° = \dfrac{\cos 17° + \sin 17°}{\cos 17° - \sin 17°}$. **(4)**

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

a) Prove that $\dfrac{\cos A + \cos 3A + \cos 5A}{\sin A + \sin 3A + \sin 5A} = \cot 3A$. **(5)**

b) Prove that $8\sin 10°\sin 50°\sin 70° = 1$. **(5)**

c) Prove that lines $7x + y - 1 = 0$ and $3x - 21y + 2 = 0$ are perpendicular to **(4)**
each other.