

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 $\left(\sqrt{x} + \frac{2}{x}\right)^8 =$ _____.
(A) 7 (B) 8 (C) 9 (D) none of these



- j) $14C_{12} = \underline{\hspace{2cm}}$
 (A) 156 (B) 19 (C) 91 (D) None of these
- k) $\frac{\pi}{12} = \underline{\hspace{2cm}}^\circ$
 (A) 15° (B) 12° (C) 25° (D) 10°
- l) $45^\circ = \underline{\hspace{2cm}}$ Radian
 (A) $\frac{\pi}{6}$ (B) $\frac{\pi}{3}$ (C) $\frac{\pi}{2}$ (D) $\frac{\pi}{4}$
- m) $\cos ec^2 \theta - \cot^2 \theta = \underline{\hspace{2cm}}$
 (A) -1 (B) 0 (C) 1 (D) None of these
- n) $\tan\left(\frac{21\pi}{4}\right) = \underline{\hspace{2cm}}$
 (A) $\frac{-1}{\sqrt{3}}$ (B) $\frac{1}{\sqrt{3}}$ (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 $m\angle B = 90^\circ$ then find value of x. (5)
- b) Find centre and radius of circle $2x^2 + 2y^2 - 8x + 4y + 2 = 0$. (5)
- c) Find the 4th term of $\left(\frac{x}{a} - \frac{a}{x}\right)^{10}$. (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 $C = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 1 & -1 \\ 1 & 1 & 1 \end{bmatrix}$ then show that $AB = AC$. (5)
- c) If the centroid of a triangle whose vertices are (-2, 3), (a, 5) and (-1, b) is (5, 5) then find the values of a and b. (4)

Q-4 Attempt all questions (14)

- a) Find the coefficient of x^{-3} in the expansion of $\left(\frac{4x}{5} + \frac{5}{2x}\right)^9$. (5)
- b) Using binomial theorem, find the approximate value of $\frac{1}{\sqrt[3]{997}}$ 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 that $2A + 3B - 4C = 0$. (4)

Q-5 Attempt all questions (14)

- a) Find the equation of perpendicular bisector to line joining points (-1, 2) and (5, 2). (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 $y = \sin x$ $\left(-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}\right)$. (5)

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

Q-7 Attempt all questions (14)

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

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

c) Prove that $\tan 62^\circ = \frac{\cos 17^\circ + \sin 17^\circ}{\cos 17^\circ - \sin 17^\circ}$. (4)

Q-8 Attempt all questions (14)

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

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

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

