

# 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)  $2 \times 3$  (B)  $3 \times 2$  (C)  $2 \times 2$  (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)  $15^\circ$  (B)  $12^\circ$  (C)  $25^\circ$  (D)  $10^\circ$
- 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 4<sup>th</sup> 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)

