

# C.U.SHAH UNIVERSITY

## Summer Examination-2019

**Subject Name : Basic Mathematics**

**Subject Code : 2TE01BMT3**

**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 (1, 3) and (0, -4) is \_\_\_\_\_.  
 (A) 50 (B)  $5\sqrt{2}$  (C)  $2\sqrt{5}$  (D) None of these
- b) If (3, 8), (4, 2) and (-1, 5) are the vertices of a triangle, the coordinates of its centroid.  
 (A) (2, -5) (B) (-2, 5) (C) (2, 5) (D) None of these
- c) If the x - intercept of a straight line  $tx - y = 3t - 6$  is 5, then value of 't' is \_\_\_\_\_.  
 (A)  $t = 3$  (B)  $t = -3$  (C)  $t = 2$  (D)  $t = -2$
- d) Radius of the circle  $x^2 + y^2 = 7$  is \_\_\_\_\_.  
 (A) 7 (B)  $\sqrt{7}$  (C)  $\frac{7}{2}$  (D) None of these
- e) If  $A = \begin{bmatrix} 3 & 7 \\ 2 & 5 \end{bmatrix}$  then  $A + A^T =$  \_\_\_\_\_.  
 (A)  $\begin{bmatrix} 6 & 10 \\ 9 & 9 \end{bmatrix}$  (B)  $\begin{bmatrix} 6 & 9 \\ 10 & 9 \end{bmatrix}$  (C)  $\begin{bmatrix} 10 & 9 \\ 9 & 6 \end{bmatrix}$  (D)  $\begin{bmatrix} 6 & 9 \\ 9 & 10 \end{bmatrix}$
- f) If  $A = \begin{bmatrix} -8 & 4 \\ -6 & 3 \end{bmatrix}$  then  $A^{-1} =$  \_\_\_\_\_.  
 (A)  $\begin{bmatrix} -8 & 4 \\ -6 & 3 \end{bmatrix}$  (B)  $\begin{bmatrix} -3 & 4 \\ -6 & 8 \end{bmatrix}$  (C)  $\begin{bmatrix} -8 & -6 \\ 4 & 3 \end{bmatrix}$  (D) Does not exist
- g) If  $A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$  then  $A^2 =$  \_\_\_\_\_.  
 (A)  $\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$  (B)  $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$  (C)  $\begin{bmatrix} 0 & -1 \\ -1 & 0 \end{bmatrix}$  (D)  $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$
- h) If  $x + \begin{bmatrix} -3 & 2 \\ 5 & 7 \end{bmatrix} = \begin{bmatrix} -2 & 4 \\ 8 & 11 \end{bmatrix}$  then  $x =$  \_\_\_\_\_.



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

- i)  $25C_{22} = \underline{\hspace{2cm}}$ .  
 (A) 3200 (B) 2500 (C) 2300 (D) 2100
- j) Number of terms in the expansion of  $(2x + 3y)^4 = \underline{\hspace{2cm}}$ .  
 (A) 5 (B) 6 (C) 7 (D) 8
- k)  $20^\circ = \underline{\hspace{2cm}}$  Radian.  
 (A)  $\frac{\pi}{2}$  (B)  $\frac{3\pi}{2}$  (C)  $\frac{\pi}{9}$  (D)  $\frac{\pi}{3}$
- l)  $\frac{3\pi}{2} = \underline{\hspace{2cm}}$ .  
 (A)  $210^\circ$  (B)  $220^\circ$  (C)  $250^\circ$  (D)  $270^\circ$
- m)  $\tan 780^\circ = \underline{\hspace{2cm}}$   
 (A)  $\frac{1}{\sqrt{3}}$  (B)  $\sqrt{3}$  (C) 1 (D) -1
- n)  $\sin^2 35^\circ + \sin^2 55^\circ = \underline{\hspace{2cm}}$   
 (A) -1 (B) 0 (C) 1 (D) None of these

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

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

- a) Show that  $(-2, -1)$ ,  $(5, -4)$ ,  $(-1, -18)$  and  $(-8, -15)$  form a rectangle. (5)
- b) Find the equation of circle having centre  $(1, 1)$  and passing through  $(-2, 4)$ . (5)
- c) Find the constant term of  $\left(x - \frac{1}{x}\right)^{10}$ . (4)

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

- a) If  $A = \begin{bmatrix} 2 & 1 & 5 \\ 0 & 3 & -1 \\ 2 & 5 & 0 \end{bmatrix}$  then find  $\text{adj}A$ . (5)
- b) If  $A = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$  then prove that  $A^4$  is an identity (unit) matrix. (5)
- c) If  $A(2, 3)$ ,  $B(4, 7)$  and  $C(-5, -1)$  are the vertices of  $\triangle ABC$ , find the length of its median AD. (4)

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

- a) Find the middle term of  $\left(\frac{x}{2} + \frac{2}{y}\right)^{12}$ . (5)
- b) Using binomial theorem, find the approximate value of  $\frac{1}{\sqrt{9.18}}$  and  $\frac{1}{\sqrt[3]{997}}$ . (5)
- c) If  $A = \begin{bmatrix} 1 & 4 \\ 3 & 2 \\ 2 & 5 \end{bmatrix}$  and  $B = \begin{bmatrix} -1 & -2 \\ 0 & 5 \\ 3 & 1 \end{bmatrix}$  then find value of  $2A - 3B$  and  $3A - 2B$ . (4)

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



- a) Find the equation of line perpendicular to line  $4x - y + 5 = 0$  and passing through  $(1, -2)$ . (5)
- b) If  $A = \begin{bmatrix} 2 & 3 \\ 1 & 0 \end{bmatrix}$ ,  $B = \begin{bmatrix} 4 & 1 \\ 2 & -3 \end{bmatrix}$  then prove that  $(A + B)^T = A^T + B^T$ . (5)
- c) If  $A = \begin{bmatrix} 1 & 2 & 0 \\ -3 & 0 & 4 \end{bmatrix}$ ,  $B = \begin{bmatrix} 0 & -1 & -3 \\ 3 & 2 & 4 \end{bmatrix}$  then solve the equation  $2(X + A) + 3B = 0$ . (4)

**Q-6**

**Attempt all questions**

(14)

- a) Using matrix method solve:  $2x - y = 4$  and  $3x + y = 1$  (5)
- b) Draw the graph of  $y = \cos x$  ( $0 \leq x \leq \pi$ ). (5)
- c) Prove that  $\tan^{-1}(\infty) + \sin^{-1}\left(\frac{\sqrt{3}}{2}\right) + \cos^{-1}\left(\frac{1}{2}\right) = \frac{7\pi}{6}$ . (4)

**Q-7**

**Attempt all questions**

(14)

- a) Find coordinates of the points of trisection of the line segment joining points  $A(4, 5)$  and  $B(13, -4)$ . (5)

b) Prove that  $\frac{\sin(\pi + \theta)}{\sin(2\pi - \theta)} + \frac{\tan\left(\frac{\pi}{2} + \theta\right)}{\cot(\pi - \theta)} + \frac{\cos(2\pi + \theta)}{\sin\left(\frac{\pi}{2} + \theta\right)} = 3$ . (5)

- c) Prove that  $\tan 5A - \tan 3A - \tan 2A = \tan 5A \tan 3A \tan 2A$ . (4)

**Q-8**

**Attempt all questions**

(14)

- a) Prove that  $\frac{\sin\theta + \sin 2\theta + \sin 3\theta}{\cos\theta + \cos 2\theta + \cos 3\theta} = \tan 2\theta$ . (5)
- b) If  $\tan\theta = \frac{1}{2}$ , prove that  $7\cos 2\theta + 8\sin 2\theta = \frac{53}{5}$ . (5)
- c) If the two straight lines  $3x + 4my + 8 = 0$  and  $3my - 9x + 10 = 0$  are perpendicular to each other, find value of  $m$ . (4)

