

# C.U.SHAH UNIVERSITY

## Summer Examination-2017

**Subject Name : Basic Mathematics**

**Subject Code : 2TE01BMT3**

**Branch: Diploma(All)**

**Semester : 1**

**Date : 22/03/2017**

**Time : 10:30 To 01:30**

**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) Centre of the circle  $x^2 + y^2 = 25$  is \_\_\_\_\_.  
 (a) (0,5) (b) (5,0) (c) (0,0) (d) None of these
- b) If A(-3, 5) and B(2, -4) are two points, find slope of AB = \_\_\_\_\_.  
 (a) -9/5 (b) 9/5 (c) -5/9 (d) 5/9
- c) y - intercept of line  $2x - 6y + 4 = 0$  is \_\_\_\_\_.  
 (a) -2/3 (b) 2/3 (c) -2 (d) 2
- d) If A(2, -7) and B(8, 3) then mid point of AB = \_\_\_\_\_.  
 (a) (-2,5) (b) (5,-2) (c) (2,5) (d) (5,2)
- e) 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
- f) If  $A = \begin{bmatrix} 1 & 3 & 4 \\ 2 & 1 & 2 \end{bmatrix}$  then  $A^T =$  \_\_\_\_\_.  
 (a)  $\begin{bmatrix} 2 & 1 \\ 1 & 3 \\ 2 & 4 \end{bmatrix}$  (b)  $\begin{bmatrix} 2 & 1 & 2 \\ 1 & 3 & 4 \end{bmatrix}$  (c)  $\begin{bmatrix} 1 & 2 \\ 3 & 1 \\ 4 & 2 \end{bmatrix}$  (d) None of these
- 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  $A = \begin{bmatrix} 7 & -6 \\ -5 & 2 \end{bmatrix}$  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)  $12C_5 = \underline{\hspace{2cm}}$   
 (a) 729 (b) 792 (c) 297 (d) 927
- j) Number of terms in the expansion of  $(\sqrt{x} + \sqrt{y})^7 = \underline{\hspace{2cm}}$ .  
 (a) 7 (b) 8 (c) 9 (d) none of these
- k)  $\cos^2 51^\circ + \sin^2 39^\circ = \underline{\hspace{2cm}}$   
 (a) 1 (b) -1 (c) 0 (d) None of these
- l)  $\tan\left(\frac{21\pi}{4}\right) = \underline{\hspace{2cm}}$   
 (a)  $\frac{-1}{\sqrt{3}}$  (b)  $\frac{1}{\sqrt{3}}$  (c) 1 (d)  $\sqrt{3}$
- m)  $30^\circ = \underline{\hspace{2cm}}$  Radian  
 (a)  $\frac{\pi}{6}$  (b)  $\frac{\pi}{3}$  (c)  $\frac{\pi}{2}$  (d)  $\frac{\pi}{4}$
- n)  $\frac{\pi}{4}$  Radian =  $\underline{\hspace{2cm}}$  Degree  
 (a)  $60^\circ$  (b)  $30^\circ$  (c)  $45^\circ$  (d)  $90^\circ$

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

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

- a) Prove that the points  $(0, -3)$ ,  $(1, -2)$  and  $(10, 7)$  are collinear. (5)
- b) If  $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$  then prove that  $A^2 - 5A + 7I = O$ . (5)
- c) Find middle term of  $\left(\frac{x}{2} + \frac{2}{y}\right)^{12}$ . (4)

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

- a) Find equation of a circle passing through points  $(2, 0)$ ,  $(0, 2)$  and  $(0, 0)$ . (5)
- b) Solve the following equations by matrix method:  $3x - 2y = 8$  and  $5x + 4y = 6$ . (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  $X + A + B = O$ . (4)

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

- a) If  $M = \begin{bmatrix} 2 & 3 \\ 0 & 1 \end{bmatrix}$ ,  $N = \begin{bmatrix} 3 & 4 \\ 2 & 1 \end{bmatrix}$  then prove that  $(MN)^T = N^T M^T$ . (5)
- b) Using binomial theorem, find the approximate value of  $(102)^{\frac{1}{2}}$  and  $\frac{1}{\sqrt[3]{997}}$ . (5)
- c) Prove that  $\tan^{-1}\left(\frac{3}{4}\right) + \sin^{-1}\left(\frac{4}{5}\right) = \frac{\pi}{2}$ . (4)

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

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



b) Find the constant term of  $\left(\sqrt{x} + \frac{2}{x}\right)^{12}$ . (5)

c) If (3, 8), (4, 2) and (-1, 5) are the vertices of a triangle, find the co ordinates of its centroid. (4)

**Q-6**

**Attempt all questions**

(14)

a) Find the equation of straight line passing through (3, 4) and parallel to line  $\frac{x}{2} + \frac{y}{2} = 1$ . (5)

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

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

**Q-7**

**Attempt all questions**

(14)

a) In which ratio Y – axis divides line segment joining points (1, 2) and (2, 1)? Find co ordinates of division point. (5)

b) Prove that  $\frac{\cos A + \cos 3A + \cos 5A}{\sin A + \sin 3A + \sin 5A} = \cot 3A$ . (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-8**

**Attempt all questions**

(14)

a) Prove that  $\cos 20^\circ + \cos 60^\circ + \cos 100^\circ + \cos 140^\circ = \frac{1}{2}$ . (5)

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

c) If A(2, 3), B(4, 7) and C(-5, -1) are the vertices of  $\Delta ABC$ , find the length of its median CF. (4)

