

# C.U.SHAH UNIVERSITY

## Summer Examination-2017

**Subject Name : Basic Mathematics**

**Subject Code : 2TE01BMT2**

**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) Radius of the circle  $x^2 + y^2 = 25$  is \_\_\_\_\_.  
 (a) 5 (b) 25 (c) 25/2 (d) None of these
- b) If A(5, -3, ) and B(-4, 2) are two points, find slope of AB = \_\_\_\_\_.  
 (a) -9/5 (b) 9/5 (c) -5/9 (d) 5/9
- c) x - intercept of line  $2x - 6y + 4 = 0$  is \_\_\_\_\_.  
 (a) -2/3 (b) 2/3 (c) -2 (d) 2
- d) If A(-7, 2) and B(3, 8) then mid point of AB = \_\_\_\_\_.  
 (a) (-2, 5) (b) (5, -2) (c) (2, 5) (d) (5, 2)
- e) Order of matrix  $\begin{bmatrix} 1 & 2 \\ 2 & 5 \\ 5 & 7 \end{bmatrix}$  is \_\_\_\_\_.  
 (a)  $2 \times 3$  (b)  $3 \times 2$  (c)  $2 \times 2$  (d) None of these
- f) If  $A = \begin{bmatrix} 1 & 2 \\ 3 & 1 \\ 4 & 2 \end{bmatrix}$  then  $A^T =$  \_\_\_\_\_.  
 (a)  $\begin{bmatrix} 2 & 1 \\ 1 & 3 \\ 2 & 4 \end{bmatrix}$  (b)  $\begin{bmatrix} 1 & 3 & 4 \\ 2 & 1 & 2 \end{bmatrix}$  (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  $(x + y)^7 = \underline{\hspace{2cm}}$ .

(a) 7 (b) 8 (c) 9 (d) none of these

k)  $\cos^2 39^\circ + \sin^2 51^\circ = \underline{\hspace{2cm}}$

(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)  $270^\circ = \underline{\hspace{2cm}}$  Radian

(a)  $\frac{\pi}{6}$  (b)  $\frac{\pi}{3}$  (c)  $\frac{3\pi}{2}$  (d)  $\frac{\pi}{4}$

n)  $\frac{3\pi}{2}$  Radian =  $\underline{\hspace{2cm}}$  Degree

(a)  $30^\circ$  (b)  $45^\circ$  (c)  $60^\circ$  (d)  $270^\circ$

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

**Q-2**

**Attempt all questions**

**(14)**

a) Prove that (12, 8), (-2, 6) and (6, 0) are the vertices of an isosceles right angled triangle. **(5)**

b) If  $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$  then prove that  $A^2 - 4A - 5I = O$ . **(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) Find the equation of circle having centre (4, 3) and passing through (7, -2). **(5)**

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

c) If  $A = \begin{bmatrix} 2 & 2 & 2 \\ 2 & 1 & -3 \\ 1 & 0 & 4 \end{bmatrix}$ ,  $B = \begin{bmatrix} 3 & 3 & 3 \\ 3 & 0 & 5 \\ 9 & 9 & -1 \end{bmatrix}$  and  $C = \begin{bmatrix} 4 & 4 & 4 \\ 5 & -1 & 5 \\ -7 & 8 & -1 \end{bmatrix}$  then find **(4)**

$2A - 3B + C$ .

**Q-4**

**Attempt all questions**

**(14)**

a) If  $A + B = \begin{bmatrix} 1 & -1 \\ 3 & 0 \end{bmatrix}$  and  $A - B = \begin{bmatrix} 3 & 1 \\ 1 & 4 \end{bmatrix}$  then find  $(AB)^{-1}$ . **(5)**

b) Using binomial theorem, find the approximate value of  $(102)^{\frac{1}{2}}$  and  $\sqrt[3]{126}$ . **(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-5 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  $(AB)^T = A^T B^T$ . (5)

b) Find the constant term of  $\left(2x^2 - \frac{1}{x}\right)^6$ . (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 AD. (4)

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

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

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

c) Prove that  $\tan 55^\circ = \frac{\cos 10^\circ + \sin 10^\circ}{\cos 10^\circ - \sin 10^\circ}$ . (4)

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

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

b) Prove that  $\frac{\sin 4x + \sin 5x + \sin 6x}{\cos 4x + \cos 5x + \cos 6x} = \tan 5x$ . (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-8 Attempt all questions (14)**

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

b) Prove that  $\frac{\cos(90^\circ - A) \cos(180^\circ - A) \tan(180^\circ + A)}{\sin(90^\circ - A) \sin(180^\circ - A) \tan(180^\circ - A)} = 1$ . (5)

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

