

# C.U.SHAH UNIVERSITY

## Winter Examination-2015

Subject Name : Basic Mathematics

Subject Code : 2TE01BMT2

Branch : Diploma(All)

Semester : 1 Date : 02/12 /2015 Time :10:30 To 1:30 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) If  $A(2, -7)$  and  $B(8, 3)$  are the given points then midpoint of  $AB$  is \_\_\_\_\_.  
(a)  $(5, -2)$  (b)  $(-2, 5)$  (c)  $(5, 5)$  (d) none of these
- b) The distance between the points  $(-5, 7)$  and  $(7, -2)$  is \_\_\_\_\_.  
(a)  $\sqrt{29}$  (b) 15 (c) 85 (d) none of these
- c) The slope of the line  $2x - 3y + 4 = 0$  is \_\_\_\_\_.  
(a)  $-\frac{2}{3}$  (b)  $\frac{3}{2}$  (c)  $\frac{2}{3}$  (d) 2
- d) The  $y$  - intercept of the line  $2x - 6y + 4 = 0$  is \_\_\_\_\_.  
(a)  $\frac{1}{3}$  (b)  $-\frac{1}{3}$  (c) -2 (d)  $\frac{2}{3}$
- e) If  $\begin{vmatrix} x & 3 \\ -2 & 2 \end{vmatrix} = 2$  then  $x =$  \_\_\_\_\_.  
(a) -2 (b) 2 (c) 4 (d) -4
- f) The order of matrix  $\begin{bmatrix} 1 & -2 \\ 3 & 4 \\ -5 & 6 \end{bmatrix}$  is \_\_\_\_\_.  
(a)  $2 \times 3$  (b)  $3 \times 2$  (c)  $3 \times 3$  (d) none of these
- g) If  $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$  then  $\text{adj}A =$  \_\_\_\_\_.  
(a)  $\begin{bmatrix} 4 & 3 \\ 2 & 1 \end{bmatrix}$  (b)  $\begin{bmatrix} -4 & 3 \\ 2 & -1 \end{bmatrix}$  (c)  $\begin{bmatrix} 4 & -2 \\ -3 & 1 \end{bmatrix}$  (d)  $\begin{bmatrix} 4 & -3 \\ -2 & 1 \end{bmatrix}$



- h) If  $A = \begin{bmatrix} 7 \\ 2 \end{bmatrix}$  and  $B = [3 \ 4]$  then  $A + B = \underline{\hspace{2cm}}$ .  
 (a)  $[10 \ 6]$  (b)  $[21 \ 8]$  (c)  **$[21 \ 8]$**  (d) not possible
- i)  ${}^{10}C_5 = \underline{\hspace{2cm}}$ .  
 (a) 252 (b) 210 (c) 126 (d) none of these
- j) Number of terms in the expansion of  $(2x + 3y)^4 = \underline{\hspace{2cm}}$ .  
 (a) **6** (b) **5** (c) **7** (d) none of these
- k)  $30^\circ = \underline{\hspace{2cm}}$  Radian  
 (a)  $\frac{\pi}{3}$  (b)  $\frac{\pi}{2}$  (c)  $\frac{\pi}{6}$  (d)  $\frac{\pi}{4}$
- l)  $\frac{\pi}{2}$  Radian =  $\underline{\hspace{2cm}}$  Degree  
 (a)  $45^\circ$  (b)  $60^\circ$  (c)  $75^\circ$  (d)  $90^\circ$
- m)  $\sin^2 52^\circ + \sin^2 38^\circ = \underline{\hspace{2cm}}$   
 (a) 1 (b) **-1** (c) **0** (d) none of these
- n)  $\cos \frac{\pi}{6} \cos \frac{\pi}{3} \cos \frac{\pi}{2} \cos \pi = \underline{\hspace{2cm}}$   
 (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) Find co ordinates of the points of trisection of the line segment joining points  $A(4, 4)$  and  $B(-2, 1)$ . (5)
- b) Prove that  $(-1, 0)$ ,  $(0, 3)$ ,  $(3, 2)$  and  $(2, -1)$  are vertices of a square. (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 CF. (4)

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

- a) Find the equation of straight line passing through  $(3, 3)$  and parallel to line  $3x + 5y + 1 = 0$ . (5)
- b) Find centre and radius of circle  $2x^2 + 2y^2 - 8x + 4y + 2 = 0$ . (5)
- c) Find the equation of circle having centre  $(1, 1)$  and passing through the point  $(-2, 4)$ . (4)

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

- a) 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  $2A - 3B + C$ . (5)



b) If  $A = \begin{bmatrix} P & Q \\ R & S \end{bmatrix}$  then prove that  $A^2 - (P+S)A + (PS - QR)I = O$ . (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 (4)  
 $2(X + A) + 3B = O$ .

**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  $(AB)^T = B^T A^T$ . (5)

b) Solve the equations using matrix method:  $3x - 2y = 8$  and  $5x + 4y = 6$  (5)

c) If  $A = \begin{bmatrix} 1 & 2 & 1 \\ 3 & 2 & 3 \\ 1 & 1 & 2 \end{bmatrix}$  then find  $A^{-1}$ . (4)

**Q-6**

**Attempt all questions**

(14)

a) Find the approximate values of  $\sqrt{17}$  and  $\sqrt[3]{1003}$  using binomial theorem. (5)

b) Find the constant term of  $\left(x^2 - \frac{2}{x^2}\right)^8$ . (5)

c) Find the 5<sup>th</sup> term of  $\left(x^2 + \frac{1}{x}\right)^6$ . (4)

**Q-7**

**Attempt all questions**

(14)

a) 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)

b) Draw the graph of  $y = \cos x$  ( $0 \leq x \leq \pi$ ). (5)

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

**Q-8**

**Attempt all questions**

(14)

a) If  $\tan \theta = \frac{2}{3}$ ,  $0 \leq \theta \leq \frac{\pi}{2}$ , find value of  $2 \sin 2\theta + 3 \cos 2\theta$ . (5)

b) Prove that  $\frac{\cos 4\theta + 2 \cos 5\theta + \cos 6\theta}{\sin 4\theta + 2 \sin 5\theta + \sin 6\theta} = \cot 5\theta$ . (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)

