

# C.U.SHAH UNIVERSITY

## Summer Examination-2018

**Subject Name : Basic Mathematics**

**Subject Code : 2TE01BMT3**

**Branch: Diploma (All)**

**Semester : 1**

**Date : 21/03/2018**

**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) If  $A(-5, 7)$  and  $B(7, -2)$  then  $AB = \underline{\hspace{2cm}}$ .  
 (A) 15 (B) 169 (C)  $\sqrt{29}$  (D) None of these
- b) If  $A(1, 7)$  and  $B(3, 3)$  are the given points, then the midpoint of  $AB$  is  $\underline{\hspace{2cm}}$ .  
 (A)  $(-2, 5)$  (B)  $(5, -2)$  (C)  $(2, 5)$  (D)  $(5, 2)$
- c)  $y$  - intercept of line  $3x + 2y - 7 = 0$  is  $\underline{\hspace{2cm}}$ .  
 (A)  $7/2$  (B)  $-7/2$  (C)  $7/3$  (D)  $-7/3$
- d) Radius of the circle  $x^2 + y^2 = 25$  is  $\underline{\hspace{2cm}}$ .  
 (A) 5 (B) 25 (C)  $5/2$  (D) None of these
- e) If  $A = \begin{bmatrix} 1 & 3 & 4 \\ 2 & 1 & 2 \end{bmatrix}$  then  $A^T = \underline{\hspace{2cm}}$ .  
 (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
- f) If  $A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$  then  $A^2 = \underline{\hspace{2cm}}$ .  
 (a)  $\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$  (b)  $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$  (c)  $\begin{bmatrix} 0 & -1 \\ -1 & 0 \end{bmatrix}$  (d)  $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$
- g) Order of matrix  $\begin{bmatrix} 1 & 2 & 5 \\ 2 & 3 & 7 \end{bmatrix}$  is  $\underline{\hspace{2cm}}$ .  
 (a)  $2 \times 3$  (b)  $3 \times 2$  (c)  $2 \times 2$  (d) None of these
- h) If  $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$  then  $\text{adj}A = \underline{\hspace{2cm}}$ .  
 (A)  $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$  (B)  $\begin{bmatrix} -a & b \\ c & -d \end{bmatrix}$  (C)  $\begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$  (D)  $\begin{bmatrix} d & b \\ c & a \end{bmatrix}$



- i)  ${}^{14}C_{12} = \underline{\hspace{2cm}}$   
 (A) 156 (B) 19 (C) 91 (D) 119
- j) Number of terms in the expansion of  $(x + y)^6 = \underline{\hspace{2cm}}$ .  
 (A) 4 (B) 5 (C) 6 (D) 7
- k)  $\frac{\pi}{6}$  Radian =  $\underline{\hspace{2cm}}$  Degree  
 (a)  $30^\circ$  (b)  $90^\circ$  (c)  $120^\circ$  (d)  $150^\circ$
- l)  $330^\circ = \underline{\hspace{2cm}}$  Radian.  
 (A)  $\frac{6\pi}{11}$  (B)  $\frac{11\pi}{6}$  (C)  $\frac{22\pi}{6}$  (D)  $\frac{13\pi}{6}$
- m)  $\sin^2 51^\circ + \cos^2 39^\circ = \underline{\hspace{2cm}}$   
 (a) 1 (b) -1 (c) 0 (d) None of these
- n)  $\sin \pi \cdot \sin 2\pi \cdot \sin 3\pi = \underline{\hspace{2cm}}$   
 (a) -1 (b) 1 (c) 0 (d) None of these

**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  $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$  then prove that  $A^2 - 4A - 5I = O$ . **(5)**

- c) Find the approximate value of  $\sqrt[3]{1003}$  using binomial theorem. **(4)**

**Q-3**

**Attempt all questions**

**(14)**

- a) Find equation of a circle passing through points  $(1, 0)$ ,  $(0, 1)$  and  $(0, 0)$ . **(5)**

- b) Using matrix method solve:  $5x + 3y = 11$  and  $3x - 2y = -1$ . **(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 **(4)**

$$2A + 3B - 4C = O.$$

**Q-4**

**Attempt all questions**

**(14)**

- a) 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)**

- b) Find the middle term of  $\left(\frac{x}{2} + \frac{2}{y}\right)^{12}$ . **(5)**

- c) Prove that  $\tan^{-1}\left(\frac{1}{2}\right) + \tan^{-1}\left(\frac{1}{3}\right) = \frac{\pi}{4}$ . **(4)**

**Q-5**

**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) Find the 4<sup>th</sup> term of  $\left(\frac{x}{a} - \frac{a}{x}\right)^{10}$ . **(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 (5)

$$\frac{x}{2} + \frac{y}{2} = 1.$$

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

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

**Q-7**

**Attempt all questions**

(14)

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

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

$$2(X + A) + 3B = 0.$$

**Q-8**

**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) If  $\tan \theta = \frac{1}{2}$ , prove that  $7 \cos 2\theta + 8 \sin 2\theta = \frac{53}{5}$ . (5)

- c) If radius of a circle  $x^2 + y^2 - 4x - 8y + k = 0$  is 4, find k. (4)

