

# C. U. SHAH UNIVERSITY

## Summer Examination-2020

Subject Name : Basic Mathematics

Subject Code : 2TE01BMT3

Branch: Diploma (All)

Semester : 1

Date : 26/02/2020

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  $P(-5, 7)$  and  $Q(7, -2)$  then  $PQ =$  \_\_\_\_\_.  
(A) 15 (B) 169 (C)  $\sqrt{29}$  (D) None of these
- b) If  $(3, 8)$ ,  $(4, 2)$  and  $(-1, 5)$  are the vertices of a triangle, then the co-ordinates of its centroid are \_\_\_\_\_.  
(A)  $(-2, 5)$  (B)  $(5, -2)$  (C)  $(2, 5)$  (D)  $(5, 2)$
- c)  $y$  - intercept of line  $2x - 6y + 4 = 0$  is \_\_\_\_\_.  
(A)  $2/3$  (B)  $3/2$  (C) 2 (D) -2
- d) Centre of the circle  $x^2 + y^2 = 5$  is \_\_\_\_\_.  
(A)  $(0, 0)$  (B)  $(0, 5)$  (C)  $(5, 0)$  (D)  $\left(\frac{5}{2}, \frac{5}{2}\right)$
- e) 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)  $\begin{bmatrix} 1 & -2 \\ -3 & 4 \end{bmatrix}$
- f) The value of  $\begin{vmatrix} 0 & -5 & 3 \\ 0 & 1 & 8 \\ 0 & 2 & 5 \end{vmatrix}$  is \_\_\_\_\_.  
(A) 21 (B) -11 (C) 0 (D) None of these
- g) If  $A = \begin{bmatrix} 7 & -3 \\ -2 & 1 \end{bmatrix}$  and  $B = \begin{bmatrix} 1 & 3 \\ 2 & 7 \end{bmatrix}$  then  $AB =$  \_\_\_\_\_.  
(A)  $\begin{bmatrix} 7 & 0 \\ 0 & 7 \end{bmatrix}$  (B)  $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$  (C)  $\begin{bmatrix} 7 & -9 \\ -4 & 7 \end{bmatrix}$  (D) None of these



- h) If  $A = \begin{bmatrix} w & x \\ y & z \end{bmatrix}$  then  $\text{adj}(\text{adj}A) = \underline{\hspace{2cm}}$ .
- (A)  $\begin{bmatrix} z & -x \\ -y & w \end{bmatrix}$  (B)  $\begin{bmatrix} w & -x \\ -y & z \end{bmatrix}$  (C)  $\begin{bmatrix} -w & x \\ y & -z \end{bmatrix}$  (D)  $\begin{bmatrix} w & x \\ y & z \end{bmatrix}$
- i)  ${}^{14}C_{12} = \underline{\hspace{2cm}}$ .
- (A) 156 (B) 19 (C) 91 (D) 119
- j) Number of terms in the expansion of  $\left(\sqrt{x} + \frac{2}{x}\right)^8 = \underline{\hspace{2cm}}$ .
- (A) 8 (B) 9 (C) 10 (D) 11
- k)  $330^\circ = \underline{\hspace{2cm}}$  Radian.
- (A)  $\frac{6\pi}{11}$  (B)  $\frac{11\pi}{6}$  (C)  $\frac{22\pi}{6}$  (D)  $\frac{13\pi}{6}$
- l)  $\frac{\pi}{12} = \underline{\hspace{2cm}}$ .
- (A)  $15^\circ$  (B)  $12^\circ$  (C)  $25^\circ$  (D)  $10^\circ$
- m)  $\text{cosec}(-330^\circ) = \underline{\hspace{2cm}}$ .
- (A)  $\frac{1}{2}$  (B)  $-\frac{1}{2}$  (C)  $-2$  (D)  $2$
- n)  $\sin \pi \cdot \sin 2\pi \cdot \sin 3\pi = \underline{\hspace{2cm}}$
- (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) Prove that (12, 8), (-2, 6) and (6, 0) are the vertices of an isosceles right angled triangle. **(5)**
- b) Find equation of the circle passing through points A(4, 0), B(0, 4) and C(0, 0). **(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) If  $A = \begin{bmatrix} -4 & -3 & -3 \\ 1 & 0 & 1 \\ 4 & 4 & 3 \end{bmatrix}$  then prove that  $\text{adj}A = A$ . **(5)**
- b) If  $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$  then prove that  $A^2 - 5A + 7I = O$ . **(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)**
- Q-4** **Attempt all questions** **(14)**
- a) Find the coefficient of  $x^{-2}$  in the expansion of  $\left(2x^2 + \frac{1}{2x}\right)^8$ . **(5)**



b) Using binomial theorem, find the approximate value of  $\sqrt[3]{128}$  and  $\frac{1}{\sqrt{9.18}}$ . (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-5**

**Attempt all questions** (14)

a) Find the equation of perpendicular bisector to line joining points  $(-1, 2)$  and  $(1, -2)$ . (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  $A = \begin{bmatrix} 2 & 3 & 6 \\ -1 & 2 & 5 \end{bmatrix}$ ,  $B = \begin{bmatrix} 0 & 2 & -8 \\ 2 & 4 & -2 \end{bmatrix}$  and  $C = \begin{bmatrix} 1 & 3 & -3 \\ 1 & 4 & 1 \end{bmatrix}$  then prove that (4)

$2A + 3B - 4C = 0$ .

**Q-6**

**Attempt all questions** (14)

a) Using matrix method solve:  $5x + 3y = 11$  and  $3x - 2y = -1$  (5)

b) Draw the graph of  $y = \sin x$  ( $0 \leq x \leq \pi$ ). (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 co-ordinates of the points of trisection of the line segment joining points  $A(4, 4)$  and  $B(-2, 1)$ . (5)

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

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

**Q-8**

**Attempt all questions** (14)

a) 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)

b) Prove that  $\cos 3\theta = 4 \cos^3 \theta - 3 \cos \theta$ . (5)

c) If two straight lines  $A_1x + B_1y + C_1 = 0$  and  $A_2x + B_2y + C_2 = 0$  are parallel to each other, prove that  $A_1B_2 - A_2B_1 = 0$ . (4)

