

# C. U. SHAH UNIVERSITY

## Summer Examination-2020

**Subject Name : Basic Mathematics**

**Subject Code : 2TE01BMT2**

**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  $d[(x, 1), (8, x)] = 5$  then  $x = \underline{\hspace{2cm}}$ .  
(A) 3 or 6   (B) 4 or 5   (C) 6 or 7   (D) None of these
- b) If  $A(2, -7)$  and  $B(8, 3)$  are the given points, find the midpoint of AB.  
(A)  $(-2, 5)$    (B)  $(5, -2)$    (C)  $(2, 5)$    (D)  $(5, 2)$
- c) Slope of the line  $2x - 3y + 4 = 0$  is  $\underline{\hspace{2cm}}$ .  
(A)  $-2/3$    (B)  $-3/2$    (C)  $3/2$    (D)  $2/3$
- d) Centre of the circle  $2x^2 + 2y^2 = 5$  is  $\underline{\hspace{2cm}}$ .  
(A)  $(0, 0)$    (B)  $(5, 0)$    (C)  $(0, 5)$    (D)  $(5/2, 5/2)$
- e) If  $\begin{vmatrix} x & -2 \\ 3 & -5 \end{vmatrix} = -4$  then  $x = \underline{\hspace{2cm}}$ .  
(A)  $-2$    (B)  $2$    (C)  $-5$    (D)  $5$
- f) 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
- g) If  $A = \begin{bmatrix} -8 & 4 \\ -6 & 3 \end{bmatrix}$  then  $A^{-1} = \underline{\hspace{2cm}}$ .  
(A)  $\begin{bmatrix} -8 & 4 \\ -6 & 3 \end{bmatrix}$    (B)  $\begin{bmatrix} -3 & 4 \\ -6 & 8 \end{bmatrix}$    (C)  $\begin{bmatrix} -8 & -6 \\ 4 & 3 \end{bmatrix}$    (D) Does not exist
- h) If  $A = \begin{bmatrix} -5 & 6 \\ 8 & -2 \end{bmatrix}$  then  $AI = \underline{\hspace{2cm}}$ .  
(A)  $\begin{bmatrix} 5 & 6 \\ 8 & 2 \end{bmatrix}$    (B)  $\begin{bmatrix} 5 & -6 \\ -8 & 2 \end{bmatrix}$    (C)  $\begin{bmatrix} -5 & 6 \\ 8 & -2 \end{bmatrix}$    (D)  $\begin{bmatrix} -5 & -6 \\ -8 & -2 \end{bmatrix}$
- i) Number of terms in the expansion of  $(5x + 7y)^7 = \underline{\hspace{2cm}}$ .  
(A) 7   (B) 8   (C) 9   (D) none of these



- j)  $10C_5 = \underline{\hspace{2cm}}$ .  
 (A) 252 (B) 225 (C) 525 (D) 522
- k)  $\frac{3\pi}{4} = \underline{\hspace{2cm}}^\circ$ .  
 (A)  $165^\circ$  (B)  $155^\circ$  (C)  $145^\circ$  (D)  $135^\circ$
- l)  $150^\circ = \underline{\hspace{2cm}}$  Radian.  
 (A)  $\frac{6\pi}{5}$  (B)  $\frac{5\pi}{6}$  (C)  $\frac{2\pi}{3}$  (D)  $\frac{3\pi}{2}$
- m)  $\operatorname{cosec}^2\theta - \cot^2\theta = \underline{\hspace{2cm}}$   
 (A) -1 (B) 0 (C) 1 (D) None of these
- n)  $\sin\frac{\pi}{3}\cos\frac{\pi}{2}\sin\frac{\pi}{4}\cos\pi = \underline{\hspace{2cm}}$   
 (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) Find centre and radius of the circle  $36x^2 + 36y^2 + 24x - 36y - 23 = 0$ . (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  $A = \begin{bmatrix} 2 & -2 \\ 3 & 1 \end{bmatrix}$ ,  $B = \begin{bmatrix} -1 & 5 \\ 4 & -3 \end{bmatrix}$  then prove that  $(AB)' = B'A'$ . (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) If  $A(2, 3)$ ,  $B(4, 7)$  and  $C(-5, -1)$  are the vertices of  $\triangle ABC$ , find the length of its median BE. (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  $\sqrt[3]{1003}$  and  $\frac{1}{4.95}$ . (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-5 Attempt all questions (14)**

- a) Find the equation of perpendicular bisector to line joining points  $(-1, 2)$  and  $(1, -2)$ . (5)



b) If  $A = \begin{bmatrix} 2 & 1 & 5 \\ 0 & 3 & -1 \\ 2 & 5 & 0 \end{bmatrix}$  then find  $\text{adj}A$ . (5)

c) If  $A = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$  then prove that  $A^4$  is an identity (unit) matrix. (4)

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

a) Solve the following equations by matrix method: (5)

$2x + 3y = 7$  and  $4x = 9 + y$

b) Draw the graph of  $y = \sin x$   $\left(-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}\right)$ . (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) In which ratio Y – axis divides line segment joining points (3, 5) and (6, 7)? Is division external or internal? Find co-ordinates of the division point. (5)

b) Prove that  $\frac{\sin\left(\theta - \frac{\pi}{2}\right)}{\cos(\theta - \pi)} + \frac{\tan\left(\frac{\pi}{2} - \theta\right)}{\cot(\pi - \theta)} + \frac{\text{cosec}\left(\frac{\pi}{2} + \theta\right)}{\sec(\pi + \theta)} = -1$ . (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) 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) If  $\tan\theta = \frac{3}{2}$ ,  $0 \leq \theta \leq \pi$  then find the value of  $3\sin\theta + 2\cos\theta$ . (5)

c) Find angle between straight lines  $\sqrt{3}x - y + 1 = 0$  and  $x - \sqrt{3}y + 2 = 0$ . (4)

