

# C.U.SHAH UNIVERSITY

## Winter Examination-2018

Subject Name : Basic Mathematics

Subject Code : 2TE01BMT2

Branch: Diploma (All)

Semester : 1

Date : 28/11/2018

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)  $AB = \underline{\hspace{2cm}}$  Where  $A(-5, 7)$  and  $B(7, 2)$ .  
(A) 13 (B) 169 (C)  $\sqrt{29}$  (D) None of these
- b) If  $A(2, -7)$  and  $B(8, 3)$  are the given points, then the midpoint of AB is \_\_\_\_\_.  
(A)  $(-2, 5)$  (B)  $(5, -2)$  (C)  $(2, 5)$  (D)  $(5, 5)$
- c) y - intercept of line  $2x - 6y + 4 = 0$  is \_\_\_\_\_.  
(A)  $-2/3$  (B)  $2/3$  (C)  $-2$  (D) 2
- d) Centre of the circle  $2x^2 + 2y^2 = 5$  is \_\_\_\_\_.  
(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)  $-2/5$  (B)  $2/5$  (C)  $-2$  (D) 2
- f) Order of matrix  $\begin{bmatrix} 1 & 2 & 5 \\ 2 & 3 & 7 \end{bmatrix}$  is \_\_\_\_\_.  
(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  $A = \begin{bmatrix} 7 \\ 2 \end{bmatrix}$  and  $B = \begin{bmatrix} 3 & 4 \end{bmatrix}$  then  $A + B = \underline{\hspace{2cm}}$ .  
(A)  $\begin{bmatrix} 10 & 6 \end{bmatrix}$  (B)  $\begin{bmatrix} 10 \\ 6 \end{bmatrix}$  (C)  $\begin{bmatrix} 21 & 8 \end{bmatrix}$  (D) Not possible
- i) Number of terms in the expansion of  $(5x + 7y)^6 = \underline{\hspace{2cm}}$ .  
(A) 6 (B) 7 (C) 8 (D) 9



- j)  ${}^{25}C_{22} = \underline{\hspace{2cm}}$ .  
 (A) 3200 (B) 2500 (C) 2300 (D) 2100
- k)  $240^\circ = \underline{\hspace{2cm}}$  Radian.  
 (A)  $\frac{4\pi}{3}$  (B)  $\frac{3\pi}{4}$  (C)  $\frac{4\pi}{5}$  (D)  $\frac{5\pi}{4}$
- l)  $\frac{5\pi}{3} = \underline{\hspace{2cm}}$ .  
 (A)  $160^\circ$  (B)  $300^\circ$  (C)  $150^\circ$  (D)  $145^\circ$
- m)  $\tan\left(\frac{21\pi}{4}\right) = \underline{\hspace{2cm}}$   
 (A)  $\frac{-1}{\sqrt{3}}$  (B)  $\frac{1}{\sqrt{3}}$  (C) 1 (D)  $\sqrt{3}$
- n)  $\sec^2\theta - \tan^2\theta = \underline{\hspace{2cm}}$   
 (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) Show that the points (4, 8), (4, 12) and  $(4 + 2\sqrt{3}, 10)$  are the vertices of an equilateral triangle. (5)
- b) Find the equation of circle having centre (4, 3) and passing through (7, -2). (5)
- c) Find the 5<sup>th</sup> term of  $\left(x^2 + \frac{1}{x}\right)^6$ . (4)

**Q-3 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) 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  $\Delta ABC$ , find the length of its median CF. (4)

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

- a) Find the constant term of  $\left(\sqrt{x} + \frac{2}{x}\right)^{12}$ . (5)
- b) Using binomial theorem, find the approximate value of  $\sqrt[3]{126}$  and  $\sqrt{17}$ . (5)
- c) If  $A = \begin{bmatrix} 1 & 4 \\ 3 & 2 \\ 2 & 5 \end{bmatrix}$  and  $B = \begin{bmatrix} -1 & -2 \\ 0 & 5 \\ 3 & 1 \end{bmatrix}$  then find value of  $2A - 3B$  and  $3A - 2B$ . (4)

**Q-5 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) If  $A = \begin{bmatrix} -4 & -3 & -3 \\ 1 & 0 & 1 \\ 4 & 4 & 3 \end{bmatrix}$  then find  $\text{adj}A$ . (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-6 Attempt all questions (14)**

a) Solve the following equations by matrix method:  $2x - y = 4$  and  $3x + y = 1$ . (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 (4, 5) and (13, -4). (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)  $\tan 20^\circ + \tan 25^\circ + \tan 20^\circ \tan 25^\circ = 1$  (4)

**Q-8 Attempt all questions (14)**

a) Prove that  $\frac{\sin\theta + \sin 2\theta + \sin 3\theta}{\cos\theta + \cos 2\theta + \cos 3\theta} = \tan 2\theta$ . (5)

b) Prove that  $\cos 20^\circ + \cos 60^\circ + \cos 100^\circ + \cos 140^\circ = \frac{1}{2}$ . (5)

c) If the centroid of a triangle whose vertices are (-2, 3), (a, 5) and (-1, b) is (5, 5) then find the values of a and b. (4)

