

C. U. SHAH UNIVERSITY

Winter Examination-2019

Subject Name : Basic Mathematics

Subject Code : 2TE01BMT2

Branch: Diploma (All)

Semester : 1

Date : 16/11/2019

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) The distance between the points (1, 2) and (2, 3) is _____.
(A) $\sqrt{2}$ (B) $2\sqrt{2}$ (C) 25 (D) None of these
- b) Midpoint of (6, 4) and (4, 6) is _____.
(A) (-5, 5) (B) (5, 5) (C) (5, -5) (D) (-5, -5)
- c) If A(-3, 5) and B(2, -4) are two points, find slope of AB.
(A) -5/9 (B) 5/9 (C) -9/5 (D) 9/5
- d) Radius of the circle $x^2 + y^2 = 5$ is _____.
(A) 5 (B) $\sqrt{5}$ (C) 5/2 (D) 2/5
- e) If $A = \begin{bmatrix} 3 & 7 \\ 2 & 5 \end{bmatrix}$ then $A + A^T =$ _____.
(A) $\begin{bmatrix} 6 & 10 \\ 9 & 9 \end{bmatrix}$ (B) $\begin{bmatrix} 6 & 9 \\ 10 & 9 \end{bmatrix}$ (C) $\begin{bmatrix} 10 & 9 \\ 9 & 6 \end{bmatrix}$ (D) $\begin{bmatrix} 6 & 9 \\ 9 & 10 \end{bmatrix}$
- f) If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ then $\text{adj}A =$ _____.
(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) $\begin{bmatrix} d & b \\ c & a \end{bmatrix}$
- g) 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
- h) If $A = [a_{ij}]_{3 \times 4}$ and $B = [b_{ij}]_{4 \times 2}$ then order of the matrix AB is _____.
(A) 2×3 (B) 3×2 (C) 4×2 (D) 2×4



- i) Number of terms in the expansion of $\left(2x + \frac{5}{x}\right)^7 = \underline{\hspace{2cm}}$.
 (A) 7 (B) 8 (C) 9 (D) none of these
- j) ${}^{12}C_5 = \underline{\hspace{2cm}}$.
 (A) 297 (B) 927 (C) 729 (D) 792
- k) $\frac{5\pi}{6} = \underline{\hspace{2cm}}^\circ$.
 (A) 160° (B) 155° (C) 150° (D) 145°
- l) $300^\circ = \underline{\hspace{2cm}}$ Radian
 (A) $\frac{5\pi}{2}$ (B) $\frac{2\pi}{5}$ (C) $\frac{3\pi}{5}$ (D) $\frac{5\pi}{3}$
- m) $\sin^2 35^\circ + \sin^2 55^\circ = \underline{\hspace{2cm}}$
 (A) -1 (B) 0 (C) 1 (D) None of these
- n) $\operatorname{cosec}(-330^\circ) = \underline{\hspace{2cm}}$
 (A) $\frac{1}{2}$ (B) $-\frac{1}{2}$ (C) -2 (D) 2

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 the equation of a circle passing through point (-7, 1) and centre (-4, -3). (5)
- c) Find the 7th term of $\left(\frac{4x}{5} - \frac{5}{2x}\right)^9$. (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 $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ 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 ΔABC , find the length of its median AD. (4)

Q-4 Attempt all questions (14)

- a) Find the middle term of $\left(2x^2 + \frac{1}{3x}\right)^6$. (5)
- b) Using binomial theorem, find the approximate value of $\sqrt[3]{128}$ and $\frac{1}{\sqrt{9.18}}$. (5)
- c) If $A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 2 \\ 2 & 1 \\ 1 & 2 \end{bmatrix}$ then find AB and BA. (4)

Q-5 Attempt all questions (14)

- a) Find the equation of straight line passing through (-1, 2) and perpendicular to line $x - 3y + 3 = 0$. (5)



b) If $A = \begin{bmatrix} -4 & -3 & -3 \\ 1 & 0 & 1 \\ 4 & 4 & 3 \end{bmatrix}$ then prove that $\text{adj}A = A$. (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: (5)

$$2x - y = 4 \text{ and } 3x + y = 1$$

b) Draw the graph of $y = \cos x \left(-\frac{\pi}{2} \leq x \leq \frac{\pi}{2} \right)$. (5)

c) Evaluate: $\sin\left(2 \tan^{-1} \frac{1}{3}\right)$ (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 $\cos^2 \frac{11\pi}{4} - \sin^2 \frac{11\pi}{4} - 2 \tan \frac{11\pi}{4} + \sec^2 \frac{11\pi}{4} = 4$ (5)

c) Prove that $(1 + \tan 25^\circ)(1 + \tan 20^\circ) = 2$. (4)

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

a) Prove that $\frac{\sin 4x + \sin 5x + \sin 6x}{\cos 4x + \cos 5x + \cos 6x} = \tan 5x$. (5)

b) Prove that $\cos 20^\circ \cos 40^\circ \cos 60^\circ \cos 80^\circ = \frac{1}{16}$. (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)

