

C. U. SHAH UNIVERSITY

Winter Examination-2019

Subject Name : Basic Mathematics

Subject Code : 2TE01BMT3

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)**

(MCQ Type of Questions=1 mark*14=14 marks)

- a) If $d[(x, 1), (8, x)] = 5$ then $x =$ _____.
 (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 $x + y - 8 = 0$ is _____.
 (A) 1 (B) -1 (C) -1/8 (D) None of these
- d) Centre of the circle $2x^2 + 2y^2 = 5$ is _____.
 (A) (0, 0) (B) (0, 5) (C) (5, 0) (D) $\left(\frac{5}{2}, \frac{5}{2}\right)$
- e) If $\begin{bmatrix} -2 & 3x+1 \\ 5 & -7 \end{bmatrix} = \begin{bmatrix} -2 & 7 \\ 5 & -7 \end{bmatrix}$ then $x =$ _____.
 (A) -3 (B) 3 (C) -2 (D) 2
- f) If $A = \begin{bmatrix} 1 & -3 & 4 \\ -2 & 1 & 2 \end{bmatrix}$ then $A^T =$ _____.
 (A) $\begin{bmatrix} 1 & -2 \\ -3 & 1 \\ 4 & 2 \end{bmatrix}$ (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
- g) If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ then $A^2 =$ _____.
 (A) $\begin{bmatrix} 7 & 10 \\ 15 & 22 \end{bmatrix}$ (B) $\begin{bmatrix} 7 & 15 \\ 10 & 22 \end{bmatrix}$ (C) $\begin{bmatrix} 22 & 15 \\ 10 & 7 \end{bmatrix}$ (D) $\begin{bmatrix} 22 & 10 \\ 15 & 7 \end{bmatrix}$
- h) Order of $\begin{bmatrix} 2 \\ 5 \end{bmatrix}$ is _____.
 (A) 2×2 (B) 2×1 (C) 3×2 (D) 2×3



- i) $10C_5 = \underline{\hspace{2cm}}$.
 (A) 252 (B) 225 (C) 250 (D) 205
- j) Number of terms in the expansion of $(x + y)^5 = \underline{\hspace{2cm}}$.
 (A) 5 (B) 6 (C) 7 (D) 8
- k) $225^\circ = \underline{\hspace{2cm}}$ Radian.
 (A) $\frac{4\pi}{5}$ (B) $\frac{5\pi}{4}$ (C) $\frac{3\pi}{5}$ (D) $\frac{5\pi}{3}$
- l) $\frac{5\pi}{12} = \underline{\hspace{2cm}}$ °.
 (A) 220° (B) 215° (C) 75° (D) 72°
- m) $\sin\left(\frac{-17\pi}{4}\right) = \underline{\hspace{2cm}}$
 (A) $\frac{1}{2}$ (B) 2 (C) $\sqrt{2}$ (D) $\frac{-1}{\sqrt{2}}$
- n) $\cos\frac{\pi}{6}\cos\frac{\pi}{3}\cos\frac{\pi}{2}\cos\pi = \underline{\hspace{2cm}}$
 (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) Show that the points (4, 8), (4, 12) and $(4 + 2\sqrt{3}, 10)$ are the vertices of an equilateral triangle. (5)
- b) Find centre and radius of circle $36x^2 + 36y^2 + 24x - 36y - 23 = 0$. (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 $A = \begin{bmatrix} 1 & -1 & 1 \\ 2 & -1 & 0 \\ 1 & 0 & 1 \end{bmatrix}$ then find A^{-1} . (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 ΔABC , find the length of its median BE. (4)

Q-4 Attempt all questions (14)

- a) Find the constant term of $\left(x - \frac{5}{x^2}\right)^8$. (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 straight line passing through $(-1, 2)$ and perpendicular to line $x - 3y + 3 = 0$. (5)

b) 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)

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) Using matrix method solve: $2x + 3y = 7$ and $4x = 9 + y$ (5)

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) In which ratio Y – axis divides line segment joining points $(3, 5)$ and $(6, 7)$? Is division external or internal? Find co-ordinates of division point. (5)

b) Prove that $\frac{\sin\left(\theta - \frac{\pi}{2}\right)}{\cos(\theta - \pi)} + \frac{\tan\left(\frac{\pi}{2} - \theta\right)}{\cot(\pi - \theta)} + \frac{\operatorname{cosec}\left(\frac{\pi}{2} + \theta\right)}{\sec(\pi + \theta)} = -1$. (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 $\frac{\sin 4x + \sin 5x + \sin 6x}{\cos 4x + \cos 5x + \cos 6x} = \tan 5x$. (5)

b) If $\tan \theta = \frac{3}{2}$, $0 \leq \theta \leq \pi$ then find 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)

