

C.U.SHAH UNIVERSITY

Summer Examination-2019

Subject Name : Basic Mathematics**Subject Code : 2TE01BMT3****Branch: Diploma (All)****Semester : 1****Date : 14/03/2019****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, 3) and (0, -4) is _____.
(A) 50 (B) $5\sqrt{2}$ (C) $2\sqrt{5}$ (D) None of these
- b) If (3, 8), (4, 2) and (-1, 5) are the vertices of a triangle, the coordinates of its centroid.
(A) (2, -5) (B) (-2, 5) (C) (2, 5) (D) None of these
- c) If the x - intercept of a straight line $tx - y = 3t - 6$ is 5, then value of 't' is _____.
(A) $t = 3$ (B) $t = -3$ (C) $t = 2$ (D) $t = -2$
- d) Radius of the circle $x^2 + y^2 = 7$ is _____.
(A) 7 (B) $\sqrt{7}$ (C) $\frac{7}{2}$ (D) None of these
- 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 $A = \begin{bmatrix} -8 & 4 \\ -6 & 3 \end{bmatrix}$ then $A^{-1} =$ _____.
(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
- g) If $A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ then $A^2 =$ _____.
(A) $\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$ (B) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ (C) $\begin{bmatrix} 0 & -1 \\ -1 & 0 \end{bmatrix}$ (D) $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$
- h) 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) $\begin{bmatrix} 1 & -2 \\ -3 & 4 \end{bmatrix}$

- i) $25C_{22} = \underline{\hspace{2cm}}$.
 (A) 3200 (B) 2500 (C) 2300 (D) 2100
- j) Number of terms in the expansion of $(2x + 3y)^4 = \underline{\hspace{2cm}}$.
 (A) 5 (B) 6 (C) 7 (D) 8
- k) $20^\circ = \underline{\hspace{2cm}}$ Radian.
 (A) $\frac{\pi}{2}$ (B) $\frac{3\pi}{2}$ (C) $\frac{\pi}{9}$ (D) $\frac{\pi}{3}$
- l) $\frac{3\pi}{2} = \underline{\hspace{2cm}}$.
 (A) 210° (B) 220° (C) 250° (D) 270°
- m) $\tan 780^\circ = \underline{\hspace{2cm}}$
 (A) $\frac{1}{\sqrt{3}}$ (B) $\sqrt{3}$ (C) 1 (D) -1
- n) $\sin^2 35^\circ + \sin^2 55^\circ = \underline{\hspace{2cm}}$
 (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 $(-2, -1)$, $(5, -4)$, $(-1, -18)$ and $(-8, -15)$ form a rectangle. (5)
- b) Find the equation of circle having centre $(1, 1)$ and passing through $(-2, 4)$. (5)
- c) Find the constant term of $\left(x - \frac{1}{x}\right)^{10}$. (4)

Q-3 Attempt all questions (14)

- a) If $A = \begin{bmatrix} 2 & 1 & 5 \\ 0 & 3 & -1 \\ 2 & 5 & 0 \end{bmatrix}$ then find $\text{adj}A$. (5)
- b) If $A = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$ then prove that A^4 is an identity (unit) matrix. (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 AD. (4)

Q-4 Attempt all questions (14)

- a) Find the middle term of $\left(\frac{x}{2} + \frac{2}{y}\right)^{12}$. (5)
- b) Using binomial theorem, find the approximate value of $\frac{1}{\sqrt{9.18}}$ and $\frac{1}{\sqrt[3]{997}}$. (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 line perpendicular to line $4x - y + 5 = 0$ and passing through $(1, -2)$. (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 $A = \begin{bmatrix} 1 & 2 & 0 \\ -3 & 0 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 0 & -1 & -3 \\ 3 & 2 & 4 \end{bmatrix}$ then solve the equation $2(X + A) + 3B = 0$. (4)

Q-6

Attempt all questions

(14)

- a) Using matrix method solve: $2x - y = 4$ and $3x + y = 1$ (5)
- b) Draw the graph of $y = \cos x$ ($0 \leq x \leq \pi$). (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 coordinates of the points of trisection of the line segment joining points $A(4, 5)$ and $B(13, -4)$. (5)

b) Prove that $\frac{\sin(\pi + \theta)}{\sin(2\pi - \theta)} + \frac{\tan\left(\frac{\pi}{2} + \theta\right)}{\cot(\pi - \theta)} + \frac{\cos(2\pi + \theta)}{\sin\left(\frac{\pi}{2} + \theta\right)} = 3$. (5)

- c) Prove that $\tan 5A - \tan 3A - \tan 2A = \tan 5A \tan 3A \tan 2A$. (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) If $\tan\theta = \frac{1}{2}$, prove that $7\cos 2\theta + 8\sin 2\theta = \frac{53}{5}$. (5)
- c) If the two straight lines $3x + 4my + 8 = 0$ and $3my - 9x + 10 = 0$ are perpendicular to each other, find value of m . (4)

