Enrollment No: _____ Exam Seat No:_____

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) $25C_{22}$ = _____.

(A) 3200 (B) 2500 (C) 2300 (D) 2100

j) Number of terms in the expansion of $(2x+3y)^4$ = _____.

(A) 5 (B) 6 (C) 7 (D) 8

k) 20° = _____Radian.

(A) $\frac{\pi}{2}$ (B) $\frac{3\pi}{2}$ (C) $\frac{\pi}{9}$ (D) $\frac{\pi}{3}$

l) $\frac{3\pi}{2}$ = _____°

(A) 210° (B) 220° (C) 250° (D) 270°

m) $\tan 780^\circ$ = _____

(A) $\frac{1}{\sqrt{3}}$ (B) $\sqrt{3}$ (C) 1 (D) – 1

n) $\sin^2 35^\circ + \sin^2 55$ = _____

(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 adjA. **(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 ΔABC, 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 $y = \cos x \quad (0 \le x \le \pi)$. **(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)**