Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Summer Examination-2019

Subject Name : Basic Mathematics
Subject Code : 2TE01BMT1 **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) $\log 1 \cdot \log 2 \cdot \log 3 \cdots\cdots \log n =$ _____
(A) 0 (B) 1 (C) $\log(1+2+3+.....+n)$ (D) None of these

b) $2^{-\log_2 5} =$ _____
(A) 5 (B) $\frac{1}{5}$ (C) $\frac{5}{2}$ (D) $\frac{2}{5}$

c) $\frac{\log 36}{\log 6} =$ _____
(A) 6 (B) $\log 6$ (C) 2 (D) None of these

d) 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) $\begin{bmatrix} 1 & -2 \\ -3 & 4 \end{bmatrix}$

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) Order of $\begin{bmatrix} 2 \\ 5 \end{bmatrix}$ is _____.
(A) 2×2 (B) 2×1 (C) 3×2 (D) None of these

g) If $\bar{x} = (1,\ 1,\ 1)$ and $\bar{y} = (2,\ -2,\ 1)$ then $\bar{x} \cdot \bar{y} =$ _____
(A) 5 (B) 1 (C) 0 (D) -1

h) If θ is the angle between the vectors $\bar{x}$ and $\bar{y}$ then $\cos\theta =$ _____
(A) $\frac{\bar{x} \cdot \bar{y}}{|\bar{x}||\bar{y}|}$ (B) $\frac{\bar{x} \times \bar{y}}{|\bar{x}||\bar{y}|}$ (C) $\frac{|\bar{x} \times \bar{y}|}{|\bar{x}||\bar{y}|}$ (D) $\frac{\bar{x} \times \bar{y}}{|\bar{x} \times \bar{y}|}$

i) Magnitude of $2i+j-3k$ is _____.

(A) 6 (B) 2 (C) 0 (D) $\sqrt{14}$

j) Number of terms in the expansion of $(5x+7y)^6$ = _____.

(A) 9 (B) 8 (C) 7 (D) 6

k) $12C_5$ = _____

(A) 729 (B) 792 (C) 297 (D) 927

l) $\frac{3\pi}{2}$ = _____ Degree

(A) 120° (B) 135° (C) 180° (D) 270°

m) 270° = _____ Radian

(A) $\frac{3\pi}{4}$ (B) $\frac{3\pi}{2}$ (C) 7π (D) 4π

n) $\sin(-225^\circ)$ = _____

(A) $\frac{1}{\sqrt{2}}$ (B) $-\frac{1}{\sqrt{2}}$ (C) $-\sqrt{2}$ (D) $\sqrt{2}$

Attempt any four questions from Q-2 to Q-8

Q-2 **Attempt all questions** **(14)**

a) Prove that $\frac{1}{\log_x yz+1}+\frac{1}{\log_y zx+1}+\frac{1}{\log_z xy+1}=1.$ **(5)**

b) Prove that $\log_{10}800 = 2+3\log_{10}2$. **(5)**

c) If $A=\begin{bmatrix}1 & 2 & 1\\ 3 & 4 & 2\end{bmatrix}$, $B=\begin{bmatrix}3 & -2 & 4\\ 1 & 5 & 0\end{bmatrix}$ then find matrix X from X + A + B = 0. **(4)**

Q-3 **Attempt all questions** **(14)**

a) If $A=\begin{bmatrix}3 & 1\\ -1 & 2\end{bmatrix}$ then prove that $A^2-5A+7I=0$. **(5)**

b) Using matrix method solve: 5x + 3y = 11 and 3x –2 y = – 1 **(5)**

c) Solve: $\frac{\log x}{\log 8}=\frac{\log 256}{\log 64}$ **(4)**

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

a) Constant forces $3i - j + 2k$ and $i + 3j - k$ act on a particle and the particle moves from the point $2i + 3j + k$ to the point $5i + 2j + 3k$. Find the work done by the forces. **(5)**

b) Prove that angle between two vectors $i + 2j$ and $i + j + 3k$ is $sin^{-1}\left(\sqrt{\frac{46}{55}}\right)$. **(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) If $A=\begin{bmatrix} -4 & -3 & -3 \\ 1 & 0 & 1 \\ 4 & 4 & 3 \end{bmatrix}$ then prove that adjA = A. **(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) Evaluate: $\tan\left(2\tan^{-1}\frac{1}{3}\right)$ **(4)**

Q-6 **Attempt all questions** **(14)**

a) Find the 5^{th} term of $\left(x^2+\frac{1}{x}\right)^6$. **(5)**

b) Find the constant term of $\left(x-\frac{5}{x^3}\right)^8$. **(5)**

c) If $\bar{a} = 3i - j - 4k$, $\bar{b} = -2i + 4j - 3k$ and $\bar{c} = -i + 2j - 5k$ then find $\left|\bar{a} + 2\bar{b} - \bar{c}\right|$. **(4)**

Q-7 **Attempt all questions** **(14)**

a) Prove that $\frac{\cos A+\cos 3A+\cos 5A}{\sin A+\sin 3A+\sin 5A} = \cot 3A$. **(5)**

b) Prove that $\tan 20° + \tan 25° + \tan 20°\tan 25° = 1$. **(5)**

c) Prove that $\left(\sqrt{3}+1\right)^4 + \left(\sqrt{3}-1\right)^4 = 56$ using binomial theorem. **(4)**

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

a) If $\tan\theta = \frac{1}{2}$, prove that $7\cos 2\theta + 8\sin 2\theta = \frac{53}{5}$. **(5)**

b) Draw the graph of $y = \sin\frac{x}{2}$, $(0 \le x \le 2\pi)$. **(5)**

c) Prove that $\tan^{-1}\left(\frac{1}{2}\right) + \tan^{-1}\left(\frac{1}{3}\right) = \frac{\pi}{4}$. **(4)**