Enrollment No: _____ Exam Seat No:_____

C. U. SHAH UNIVERSITY

Summer Examination-2020

Subject Name : Basic Mathematics

Subject Code : 2TE01BMT1 **Branch: Diploma (All)**

Semester : 1 **Date : 26/02/2020** **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) $\log_{10} 0.0001 =$ _____

(A) -4 (B) 1 (C) 0 (D) 4

b) $4^{-\log_4 5} =$ _____

(A) 5 (B) $\frac{1}{5}$ (C) $\frac{5}{2}$ (D) $\frac{2}{5}$

c) $\frac{\log \sqrt[3]{36}}{\log \sqrt{6}} =$ _____

(A) 6 (B) $\log 6$ (C) 4/3 (D) 3/4

d) If $\begin{vmatrix} x & -2 \\ 3 & -5 \end{vmatrix} = -4$ then x = _____.

(A) $-2/5$ (B) 2/5 (C) -2 (D) 2

e) If $A = \begin{bmatrix} 1 & 2 \\ 3 & 1 \\ 4 & 2 \end{bmatrix}$ then A^T = _____.

(A) $\begin{bmatrix} 2 & 1 \\ 1 & 3 \\ 2 & 4 \end{bmatrix}$ (B) $\begin{bmatrix} 1 & 3 & 4 \\ 2 & 1 & 2 \end{bmatrix}$ (C) $\begin{bmatrix} 1 & 2 \\ 3 & 1 \\ 4 & 2 \end{bmatrix}$ (D) None of these

f) Order of matrix $\begin{bmatrix} 1 & 2 & 5 \\ 2 & 3 & 7 \end{bmatrix}$ is = _____.

(A) 2×3 (B) 3×2 (C) 2×2 (D) None of these

g) $-3(5, -1, -2)+8(1, 1, 0) =$ _____

(A) $(7,11,6)$ (B) $(7,-11,6)$ (C) $(7,11,-6)$ (D) $(-7,11,6)$

h) If $\bar{a} = i + j - k$ then $\hat{a} =$ _____

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

i) $(2,-1,3)\times(-4,2,-6) =$ _____.

(A) $(-8,-2,-18)$ (B) $(8,2,18)$ (C) $(0,0,0)$ (D) None of these

j) Number of terms in the expansion of $(4x+y)^5$ = _____.

(A) 4 (B) 5 (C) 6 (D) 7

k) $25C_{22}$ = _____

(A) 2300 (B) 230 (C) 575 (D) 275

l) $\frac{\pi}{4}$ Radian = _____ Degree

(A) 60° (B) 30° (C) 45° (D) 90°

m) $20°$ = _____Radian.

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

n) $\tan\left(\frac{21\pi}{4}\right) =$ _____

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

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

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

a) Prove that $\frac{1}{\log_6 24}+\frac{1}{\log_{12} 24}+\frac{1}{\log_8 24}=2$. **(5)**

b) If $\log\left(\frac{a-b}{2}\right)=\frac{1}{2}(\log a+\log b)$ then prove that $a^2+b^2=6ab$. **(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-3 **Attempt all questions** **(14)**

a) If $A=\begin{bmatrix}1 & 2 & 2\\ 2 & 1 & 2\\ 2 & 2 & 1\end{bmatrix}$ then prove that $A^2-4A-5I=O$. **(5)**

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

c) Solve: $\log_2(x+5)+\log_2(x-2)=3$ **(4)**

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

a) A particle moves from the point $-i-j-k$ to the point $k+j+i$ under the effect of two constant forces $2i+j+k$ and $i+3j+k$. Find the work done. **(5)**

b) Find unit vector which is perpendicular to $\bar{a} = 5i + 7j - 2k$ and $\bar{b} = j - 2k + 3i$. **(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) If $A=\begin{bmatrix}2 & 1 & 5\\ 0 & 3 & -1\\ 2 & 5 & 0\end{bmatrix}$ then find adjA. **(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) Evaluate: $\sin\left(2\tan^{-1}\frac{1}{3}\right)$ **(4)**

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

a) Find the 7^{th} term of $\left(\frac{4x}{5}-\frac{5}{2x}\right)^9$. **(5)**

b) Find the middle term of $\left(2x^2+\frac{1}{3x}\right)^6$. **(5)**

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

Q-7 **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 $\tan 62^\circ=\frac{\cos 17^\circ+\sin 17^\circ}{\cos 17^\circ-\sin 17^\circ}$. **(5)**

c) Find the approximate value of $\sqrt[3]{1003}$ and $\frac{1}{4.95}$. **(4)**

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

a) Prove that $\cos 4\theta = 8\cos^4\theta - 8\cos^2\theta + 1$. **(5)**

b) Draw the graph of $y = 2\cos x \quad (0 \le x \le \pi)$. **(5)**

c) Prove that $\sin^{-1}\left(\frac{3}{5}\right)+\tan^{-1}\left(\frac{4}{3}\right)=\frac{\pi}{2}$. **(4)**