Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Summer Examination-2018

Subject Name : Basic Mathematics

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

Semester : 1 **Date : 21/03/2018** **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) $4^{-\log_4 5} =$ _____

(A) 5 (B) $\frac{1}{5}$ (C) $\frac{5}{4}$ (D) $\frac{4}{5}$

c) $\frac{\log 49}{\log 7} =$ _____

(A) 7 (B) $\log 7$ (C) 2 (D) None of these

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

(A) $\begin{bmatrix} 1 & -2 \\ -3 & 4 \end{bmatrix}$ (B) $\begin{bmatrix} -1 & 3 \\ 2 & -4 \end{bmatrix}$ (C) $\begin{bmatrix} 4 & 3 \\ 2 & 1 \end{bmatrix}$ (D) $\begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$

e) 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

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

(A) –2 (B) 2 (C) –5 (D) 5

g) $|2i + j - 3k| =$ _____.

(A) $\sqrt{14}$ (B) $\sqrt{13}$ (C) $\sqrt{41}$ (D) 4

h) 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

i) If θ is the angle between the vectors $\bar{x}$ and $\bar{y}$ then $\sin\theta =$ _____

(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) $\frac{\bar{x}\times\bar{y}}{|\bar{x}\times\bar{y}|}$

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

(A) 6 (B) 5 (C) 4 (D) None of these

k) $\frac{5\pi}{6} =$ _____°

(A) 160° (B) 155° (C) 150° (D) 145°

l) 300° = _____Radian

(A) $\frac{5\pi}{2}$ (B) $\frac{2\pi}{5}$ (C) $\frac{3\pi}{5}$ (D) $\frac{5\pi}{3}$

m) $\sin(-225^\circ) =$ _____.

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

n) $\sec^2\theta - \tan^2\theta =$ _____

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

b) Prove that $\log_{10} 800 = 2+3\log_{10} 2$. **(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-3 **Attempt all questions** **(14)**

a) 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 **(5)**

$2(X + A) + 3B = 0$.

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

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

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

a) Forces $\bar{F}_1 = i + 2j - 3k$ and $\bar{F}_2 = i - j + 2k$ act on a particle under the influence of these forces, particle moves from point $(3, 1, 2)$ to $(1, 3, -1)$. Find the work done. **(5)**

b) Prove that the angle between two vectors $i+2j$ and $i+j+3k$ is $\sin^{-1}\left(\sqrt{\frac{46}{55}}\right)$. **(5)**

c) If $A=\begin{bmatrix}2 & 3\\ 1 & 0\end{bmatrix}$, $B=\begin{bmatrix}4 & 1\\ 2 & -3\end{bmatrix}$ then prove that $(A+B)^T = A^T + B^T$. **(4)**

Q-5 **Attempt all questions** **(14)**

a) If $A=\begin{bmatrix}1 & 2\\ 3 & 4\end{bmatrix}$ then prove that $A^2-5A-2I=O$. **(5)**

b) If $A=\begin{bmatrix}-4 & -3 & -3\\ 1 & 0 & 1\\ 4 & 4 & 3\end{bmatrix}$ then prove that adjA = A. **(5)**

c) Prove that $\dfrac{\cos(90°-A)\cos(180°-A)\tan(180°+A)}{\sin(90°-A)\sin(180°-A)\tan(180°-A)}=1$. **(4)**

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

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

b) Find the middle term of $\left(\dfrac{x^2}{3}+\dfrac{2}{x^3}\right)^{10}$. **(5)**

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

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

a) Prove that $\dfrac{\cos 4\theta+2\cos 5\theta+\cos 6\theta}{\sin 4\theta+2\sin 5\theta+\sin 6\theta}=\cot 5\theta$. **(5)**

b) Prove that $\tan 10°+\tan 35°+\tan 10°\tan 35°=1$. **(5)**

c) Using binomial theorem, find the approximate value of $\dfrac{1}{\sqrt[3]{997}}$. **(4)**

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

a) Prove that $\dfrac{\sin A+\sin 2A}{1+\cos A+\cos 2A}=\tan A$. **(5)**

b) Draw the graph of $y=\cos x$ $\left(\dfrac{-\pi}{2}\le x\le\dfrac{\pi}{2}\right)$. **(5)**

c) Prove that $\tan^{-1}(\infty)+\sin^{-1}\left(\dfrac{\sqrt{3}}{2}\right)+\cos^{-1}\left(\dfrac{1}{2}\right)=\dfrac{7\pi}{6}$. **(4)**