**Enrollment No: _____ Exam Seat No:_____**

# C.U.SHAH UNIVERSITY
## Winter Examination-2018

**Subject Name : Basic Mathematics**

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

**Semester : 1** **Date : 28/11/2018** **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.

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**Q-1** **Attempt the following questions:** **(14)**

**a)** $\log 1 \cdot \log 2 \cdot \log 3 \cdots\cdots \log n =$

(A) 0 (B) $\log(1+2+3+\cdots\cdots+n)$ (C) $\log(1 \cdot 2 \cdot 3 \cdots\cdots n)$ (D) none of these

**b)** $5^{-\log_5 4}$ = _____

(A) 4 (B) $4^{-1}$ (C) 5 (D) $5^{-1}$

**c)** $\log_{10}(0.001)$ = _____

(A) 1 (B) 0 (C) $-3$ (D) None of these

**d)** If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ then adjA = _____.

(A) $\begin{bmatrix} a & -b \\ -c & d \end{bmatrix}$ (B) $\begin{bmatrix} -a & b \\ c & -d \end{bmatrix}$ (C) $\begin{bmatrix} -a & -b \\ -c & -d \end{bmatrix}$ (D) $\begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$

**e)** 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) $\begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$

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

(A) $2 \times 3$ (B) $3 \times 2$ (C) $2 \times 2$ (D) None of these

**g)** If $\bar{x} = (1,1,1)$ and $\bar{y} = (1,0,0)$ then $\bar{x} - \bar{y}$ = _____.

(A) $(0,1,0)$ (B) $(0,0,1)$ (C) $(1,0,0)$ (D) $(0,1,1)$

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

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

**i)** If $\theta$ 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) $\frac{\bar{x}\times\bar{y}}{|\bar{x}\times\bar{y}|}$

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

(A) 9 (B) 8 (C) 6 (D) None of these

**k)** $14C_{12}$ = _____

(A) 156 (B) 19 (C) 91 (D) None of these

**l)** $300^\circ$ = _____Radian

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

**m)** $\frac{\pi}{12}$ = _____$^\circ$

(A) $15^\circ$ (B) $12^\circ$ (C) $25^\circ$ (D) $10^\circ$

**n)** $\cos ec(-330^\circ)$ = _____

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

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

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

**a)** If $\log\left(\frac{a+b}{2}\right)=\frac{1}{2}(\log a+\log b)$ then prove that $a=b$. **(5)**

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

**c)** If $A=\begin{bmatrix}2 & 3 & 6\\ -1 & 2 & 5\end{bmatrix}$, $B=\begin{bmatrix}0 & 2 & -8\\ 2 & 4 & -2\end{bmatrix}$ and $C=\begin{bmatrix}1 & 3 & -3\\ 1 & 4 & 1\end{bmatrix}$ then prove that **(4)**

$2A+3B-4C=0$.

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

**a)** For matrices $A=\begin{bmatrix}1 & 2 & 0\\ 1 & 1 & 0\\ -1 & 4 & 0\end{bmatrix}$, $B=\begin{bmatrix}1 & 2 & 3\\ 1 & 1 & -1\\ 2 & 2 & 2\end{bmatrix}$ and $C=\begin{bmatrix}1 & 2 & 3\\ 1 & 1 & -1\\ 1 & 1 & 1\end{bmatrix}$ then show **(5)**

that AB = AC.

**b)** Using matrix method solve: 2x – y = 4 and 3x + y = 1 **(5)**

**c)** Solve: $\frac{4\log 3\times\log x}{\log 9}=\log 27$ **(4)**

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

**a)** Forces (1, 2, 3), (– 1, 2, 3) and (– 1, 2, – 3) act on a particles and the particle moves from the point (0, 1, –2) to (– 1, 3, 2). Find the work done by the forces. **(5)**

**b)** Find unit vector which is perpendicular to $\bar{a}=i+j+k$ and $\bar{b}=2i-2j+k$. **(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-5** **Attempt all questions** **(14)**

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

**b)** If $A=\begin{bmatrix}1 & 2 & 1\\ 3 & 2 & 3\\ 1 & 1 & 2\end{bmatrix}$ then find $A^{-1}$. **(5)**

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

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

**a)** Find the middle term of $\left(\frac{x}{2}+\frac{2}{y}\right)^{12}$. **(5)**

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

**c)** If $\bar{a}=(2,\ 1,\ 0)$, $\bar{b}=(1,\ -1,\ 3)$ and $\bar{c}=(3,\ 3,\ -1)$ then find modulus of $\bar{a}+2\bar{b}-2\bar{c}$. **(4)**

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

**a)** Prove that $\frac{\sin 4\theta+\sin 5\theta+\sin 6\theta}{\cos 4\theta+\cos 5\theta+\cos 6\theta}=\tan 5\theta$. **(5)**

**b)** Prove that $\tan 5A-\tan 3A-\tan 2A=\tan 5A\tan 3A\tan 2A$. **(5)**

**c)** Using binomial theorem, find the approximate value of $\frac{1}{\sqrt{9.18}}$. **(4)**

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

**a)** Prove that $\frac{\sin 3A}{sinA}-\frac{\cos 3A}{cosA}=2$. **(5)**

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