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

# C.U.SHAH UNIVERSITY

## Summer Examination-2018

**Subject Name : Basic Mathematics**

**Subject Code : 2TE01BMT2** **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.

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

**a)** AB = _____ Where A(– 5, 7) and B(7, 2).

(a) 13 (b) 169 (c) $\sqrt{29}$ (d) None of these

**b)** Midpoint of A(2, –7) and B(4, 3) = _____.

(a) $(-2,5)$ (b) $(3,-2)$ (c) $(2,5)$ (d) $(5,2)$

**c)** Slope of the line 2x + 3y – 7 = 0 is _____.

(a) 2/3 (b) –2/3 (c) 3/2 (d) – 3/2

**d)** Radius of the circle $x^2 + y^2 = 25$ is _____ .

(a) 25 (b) 52 (c) 5 (d) None of these

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

(a) $\begin{bmatrix} 2 & 1 \\ 1 & 3 \\ 2 & 4 \end{bmatrix}$ (b) $\begin{bmatrix} 2 & 1 & 2 \\ 1 & 3 & 4 \end{bmatrix}$ (c) $\begin{bmatrix} 1 & 2 \\ 3 & 1 \\ 4 & 2 \end{bmatrix}$ (d) None of these

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

(a) – 2/5 (b) 2/5 (c) – 2 (d) 2

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

(a) $2\times3$ (b) $3\times2$ (c) $2\times2$ (d) None of these

**h)** If $A = \begin{bmatrix} -7 & 6 \\ 5 & -2 \end{bmatrix}$ then AI = _____.

(a) $\begin{bmatrix} -7 & 6 \\ 5 & -2 \end{bmatrix}$ (b) $\begin{bmatrix} 7 & -6 \\ -5 & 2 \end{bmatrix}$ (c) $\begin{bmatrix} 7 & 6 \\ 5 & 2 \end{bmatrix}$ (d) None of these

**i)** $25C_{22}$ = _____

(a) 2300 (b) 230 (c) 575 (d) 275

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

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

**k)** $45^\circ$ = _____ Radian

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{2}$ (d) $\frac{\pi}{4}$

**l)** $\frac{\pi}{6}$ Radian = _____ Degree

(a) $60^\circ$ (b) $30^\circ$ (c) $45^\circ$ (d) $90^\circ$

**m)** $\sin^2 51^\circ + \cos^2 39^\circ$ = _____

(a) 1 (b) – 1 (c) 0 (d) None of these

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

(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)** Show that (–2 , –1 ), (5, – 4), (– 1, –18) and (– 8, –15) form a rectangle. **(5)**

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

**c)** Find the approximate value of $\frac{1}{\sqrt[3]{997}}$ using binomial theorem. **(4)**

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

**a)** Find the equation of circle having centre (1, 1) and passing through ( – 2, 4). **(5)**

**b)** Solve the following equations by matrix method: 3x – 2y = 8 and 5x + 4y = 6. **(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-4** **Attempt all questions** **(14)**

**a)** If $M=\begin{bmatrix}2 & 3\\ 0 & 1\end{bmatrix}$, $N=\begin{bmatrix}3 & 4\\ 2 & 1\end{bmatrix}$ then prove that $(MN)^T=N^TM^T$. **(5)**

**b)** Find the constant term of $\left(\sqrt{x}+\frac{2}{x}\right)^{12}$. **(5)**

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

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

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

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

**c)** If $A(2, 3)$, $B(4, 7)$ and $C(-5, -1)$ are the vertices of $\Delta ABC$, find the length of its median CF. **(4)**

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

**a)** Find the equation of perpendicular bisector to line joining points (– 1, 2) and (1, – 2). **(5)**

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

**c)** Prove that $\tan 62° = \dfrac{\cos 17° + \sin 17°}{\cos 17° - \sin 17°}$. **(4)**

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

**a)** Find co ordinates of the points of trisection of the line segment joining points A(4, 5) and B(13, – 4). **(5)**

**b)** 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)**

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

**a)** Prove that $\dfrac{\sin(\pi + \theta)}{\sin(2\pi - \theta)} + \dfrac{\tan\left(\dfrac{\pi}{2} + \theta\right)}{\cot(\pi - \theta)} + \dfrac{\cos(2\pi + \theta)}{\sin\left(\dfrac{\pi}{2} + \theta\right)} = 3$. **(5)**

**b)** Prove that $\cos 20° + \cos 60° + \cos 100° + \cos 140° = \dfrac{1}{2}$. **(5)**

**c)** If (3, 8), (4, 2) and (–1, 5) are the vertices of a triangle, find the co ordinates of its centroid. **(4)**