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

C.U.SHAH UNIVERSITY
Winter Examination-2015

Subject Name : Basic Mathematics

Subject Code : 2TE01BMT2 **Branch :** Diploma(All)

Semester : 1 **Date :** 02/12 /2015 **Time :**10:30 To 1:30 **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) If $A(2,-7)$ and $B(8,3)$ are the given points then midpoint of AB is _____.

(a) $(5,-2)$ (b) $(-2,5)$ (c) $(5,5)$ (d) none of these

b) The distance between the points $(-5,7)$ and $(7,-2)$ is _____.

(a) $\sqrt{29}$ (b) 15 (c) 85 (d) none of these

c) The slope of the line $2x-3y+4=0$ is _____.

(a) $\frac{-2}{3}$ (b) $\frac{3}{2}$ (c) $\frac{2}{3}$ (d) 2

d) The y – intercept of the line $2x-6y+4=0$ is _____.

(a) $\frac{1}{3}$ (b) $\frac{-1}{3}$ (c) -2 (d) $\frac{2}{3}$

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

(a) -2 (b) 2 (c) 4 (d) -4

f) The order of matrix $\begin{bmatrix} 1 & -2 \\ 3 & 4 \\ -5 & 6 \end{bmatrix}$ is _____.

(a) 2×3 (b) 3×2 (c) 3×3 (d) none of these

g) If $A=\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ then adjA = _____.

(a) $\begin{bmatrix} 4 & 3 \\ 2 & 1 \end{bmatrix}$ (b) $\begin{bmatrix} -4 & 3 \\ 2 & -1 \end{bmatrix}$ (c) $\begin{bmatrix} 4 & -2 \\ -3 & 1 \end{bmatrix}$ (d) $\begin{bmatrix} 4 & -3 \\ -2 & 1 \end{bmatrix}$

h) If $A=\begin{bmatrix}7\\2\end{bmatrix}$ and $B=\begin{bmatrix}3 & 4\end{bmatrix}$ then $A + B =$ _____.

(a) $\begin{bmatrix}10 & 6\end{bmatrix}$ (b) $\begin{bmatrix}21 & 8\end{bmatrix}$ (c) $\begin{bmatrix}21 & 8\end{bmatrix}$ (d) not possible

i) $10C_5$ = _____.

(a) 252 (b) 210 (c) 126 (d) none of these

j) Number of terms in the expansion of $(2x+3y)^4$ = _____.

(a) 6 (b) 5 (c) 7 (d) none of these

k) 30° = _____ Radian

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

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

(a) 45° (b) 60° (c) 75° (d) 90°

m) $\sin^2 52° + \sin^2 38°$ = _____

(a) 1 (b) -1 (c) 0 (d) none of these

n) $\cos\frac{\pi}{6}\cos\frac{\pi}{3}\cos\frac{\pi}{2}\cos\pi$ = _____

(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) Find co ordinates of the points of trisection of the line segment joining points $A(4, 4)$ and $B(-2, 1)$. **(5)**

b) Prove that $(-1, 0)$, $(0, 3)$, $(3, 2)$ and $(2, -1)$ are vertices of a square. **(5)**

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

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

a) Find the equation of straight line passing through $(3, 3)$ and parallel to line $3x + 5y + 1 = 0$. **(5)**

b) Find centre and radius of circle $2x^2 + 2y^2 - 8x + 4y + 2 = 0$. **(5)**

c) Find the equation of circle having centre $(1, 1)$ and passing through the point $(-2, 4)$. **(4)**

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

a) If $A=\begin{bmatrix}2 & 2 & 2\\2 & 1 & -3\\1 & 0 & 4\end{bmatrix}$, $B=\begin{bmatrix}3 & 3 & 3\\3 & 0 & 5\\9 & 9 & -1\end{bmatrix}$ and $C=\begin{bmatrix}4 & 4 & 4\\5 & -1 & 5\\-7 & 8 & -1\end{bmatrix}$ then find $2A - 3B + C$. **(5)**

b) If $A=\begin{bmatrix} P & Q \\ R & S \end{bmatrix}$ then prove that $A^2-(P+S)A+(PS-QR)I=O$. **(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 $2(X+A)+3B=0$. **(4)**

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

a) If $A=\begin{bmatrix} 2 & 3 \\ 0 & 1 \end{bmatrix}$, $B=\begin{bmatrix} 3 & 4 \\ 2 & 1 \end{bmatrix}$ then prove that $(AB)^T=B^TA^T$. **(5)**

b) Solve the equations using matrix method: $3x-2y=8$ and $5x+4y=6$ **(5)**

c) If $A=\begin{bmatrix} 1 & 2 & 1 \\ 3 & 2 & 3 \\ 1 & 1 & 2 \end{bmatrix}$ then find A^{-1}. **(4)**

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

a) Find the approximate values of $\sqrt{17}$ and $\sqrt[3]{1003}$ using binomial theorem. **(5)**

b) Find the constant term of $\left(x^2-\frac{2}{x^2}\right)^8$. **(5)**

c) Find the 5^{th} term of $\left(x^2+\frac{1}{x}\right)^6$. **(4)**

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

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

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

c) Prove that $\tan 55^\circ=\frac{\cos 10^\circ+\sin 10^\circ}{\cos 10^\circ-\sin 10^\circ}$. **(4)**

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

a) If $\tan\theta=\frac{2}{3}, 0\le\theta\le\frac{\pi}{2}$, find value of $2\sin 2\theta+3\cos 2\theta$. **(5)**

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

c) 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)**