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

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

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

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 $\operatorname{adj}A =$ _____.

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

l) $\dfrac{\pi}{2}$ 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 \dfrac{\pi}{6} \cos \dfrac{\pi}{3} \cos \dfrac{\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 $\triangle ABC$, 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 **(4)**

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

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 $(AB)^T = B^T A^T$. **(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 $\left(x^2 - \dfrac{2}{x^2} \right)^8$. **(5)**

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

Q-7 **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) Draw the graph of $y = \cos x \ (0 \le x \le \pi)$. **(5)**

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

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

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