

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 $\text{adj}A =$ _____.
(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 $B = [3 \ 4]$ then $A + B = \underline{\hspace{2cm}}$.
 (a) $[10 \ 6]$ (b) $[21 \ 8]$ (c) **$[21 \ 8]$** (d) not possible
- i) ${}^{10}C_5 = \underline{\hspace{2cm}}$.
 (a) 252 (b) 210 (c) 126 (d) none of these
- j) Number of terms in the expansion of $(2x + 3y)^4 = \underline{\hspace{2cm}}$.
 (a) **6** (b) **5** (c) **7** (d) none of these
- k) $30^\circ = \underline{\hspace{2cm}}$ Radian
 (a) $\frac{\pi}{3}$ (b) $\frac{\pi}{2}$ (c) $\frac{\pi}{6}$ (d) $\frac{\pi}{4}$
- l) $\frac{\pi}{2}$ Radian = $\underline{\hspace{2cm}}$ Degree
 (a) 45° (b) 60° (c) 75° (d) 90°
- m) $\sin^2 52^\circ + \sin^2 38^\circ = \underline{\hspace{2cm}}$
 (a) 1 (b) **-1** (c) **0** (d) none of these
- n) $\cos \frac{\pi}{6} \cos \frac{\pi}{3} \cos \frac{\pi}{2} \cos \pi = \underline{\hspace{2cm}}$
 (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)
 $2(X + A) + 3B = O$.

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 $\left(x^2 - \frac{2}{x^2}\right)^8$. (5)

c) Find the 5th 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 $y = \cos x$ ($0 \leq x \leq \pi$). (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 $\tan \theta = \frac{2}{3}$, $0 \leq \theta \leq \frac{\pi}{2}$, 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)

