

C.U.SHAH UNIVERSITY

Winter Examination-2018

Subject Name : Basic Mathematics

Subject Code : 2TE01BMT3

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.

Q-1

Attempt the following questions:

(14)

- a) If P(1, 2) and Q(2, 3) then PQ = _____.
(A) $\sqrt{2}$ (B) 2 (C) $2\sqrt{2}$ (D) None of these
- b) If A(2, 7) and B(8, 3) are the given points, then the midpoint of AB is _____.
(A) (-2, 5) (B) (5, -2) (C) (2, 5) (D) (5, 5)
- c) x - intercept of line $3x + 2y - 7 = 0$ is _____.
(A) $7/2$ (B) $-7/2$ (C) $7/3$ (D) $-7/3$
- d) Radius of the circle $x^2 + y^2 = 100$ is _____.
(A) 50 (B) 10 (C) 25 (D) 5
- e) 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
- f) If $A = \begin{bmatrix} 3 & 7 \\ 2 & 5 \end{bmatrix}$ then $A + A^T =$ _____.
(A) $\begin{bmatrix} 6 & 10 \\ 9 & 9 \end{bmatrix}$ (B) $\begin{bmatrix} 6 & 9 \\ 10 & 9 \end{bmatrix}$ (C) $\begin{bmatrix} 10 & 9 \\ 9 & 6 \end{bmatrix}$ (D) $\begin{bmatrix} 6 & 9 \\ 9 & 10 \end{bmatrix}$
- g) If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ then $\text{adj}A =$ _____.
(A) $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$ (B) $\begin{bmatrix} -a & b \\ c & -d \end{bmatrix}$ (C) $\begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$ (D) $\begin{bmatrix} d & b \\ c & a \end{bmatrix}$
- h) If $A = [a_{ij}]_{3 \times 4}$ and $B = [b_{ij}]_{4 \times 2}$ then order of the matrix AB is _____.
(A) 2×3 (B) 3×2 (C) 4×2 (D) None of these



i) Number of terms in the expansion of $\left(\sqrt{x} + \frac{2}{x}\right)^8 = \underline{\hspace{2cm}}$.

(A) 8 (B) 9 (C) 10 (D) 11

j) $12C_5 = \underline{\hspace{2cm}}$.

(A) 297 (B) 927 (C) 729 (D) 792

k) $225^\circ = \underline{\hspace{2cm}}$ Radian.

(A) $\frac{4\pi}{3}$ (B) $\frac{3\pi}{4}$ (C) $\frac{4\pi}{5}$ (D) $\frac{5\pi}{4}$

l) $\frac{5\pi}{6} = \underline{\hspace{2cm}}$.

(A) 160° (B) 155° (C) 150° (D) 145°

m) $\sec(-1305^\circ) = \underline{\hspace{2cm}}$.

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

n) $\cos \frac{\pi}{2} \sin \frac{3\pi}{2} \sin \frac{5\pi}{2} = \underline{\hspace{2cm}}$

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

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

Q-2

Attempt all questions

(14)

a) Show that the points A(1, 2), B(2, 3) and C(0, 5) are the vertices of a right angled triangle. **(5)**

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

c) Find the middle term of $(2x + 3y)^7$. **(4)**

Q-3

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 $(MN)^T = N^T M^T$. **(5)**

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

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

Q-4

Attempt all questions

(14)

a) Find the coefficient of x^{-3} in the expansion of $\left(\frac{4x}{5} + \frac{5}{2x}\right)^9$. **(5)**

b) Using binomial theorem, find the approximate value of $(101)^{\frac{3}{2}}$ and $\frac{1}{\sqrt{9.18}}$. **(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)**

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

Q-5

Attempt all questions

(14)

a) Find the equation of line perpendicular to line $4x - y + 5 = 0$ and passing through (1, -2). **(5)**



b) If $A = \begin{bmatrix} 1 & 2 & 1 \\ 3 & 2 & 3 \\ 1 & 1 & 2 \end{bmatrix}$ then find A^{-1} . (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-6 Attempt all questions (14)

a) Solve the following equations by matrix method: $3x - 2y = 8$ and $5x + 4y = 6$ (5)

b) Draw the graph of $y = \sin x$ $\left(-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}\right)$. (5)

c) Evaluate: $\tan\left(2 \tan^{-1} \frac{1}{3}\right)$ (4)

Q-7 Attempt all questions (14)

a) In which ratio Y – axis divides line segment joining points (1, 2) and (2, 1)? Find co ordinates of division point. (5)

b) Prove that $\frac{\cos(90^\circ - A) \cos(180^\circ - A) \tan(180^\circ + A)}{\sin(90^\circ - A) \sin(180^\circ - A) \tan(180^\circ - A)} = 1$. (5)

c) Prove that $\tan 57^\circ = \frac{\cos 12^\circ + \sin 12^\circ}{\cos 12^\circ - \sin 12^\circ}$. (4)

Q-8 Attempt all questions (14)

a) Prove that $\frac{\cos A + \cos 3A + \cos 5A}{\sin A + \sin 3A + \sin 5A} = \cot 3A$. (5)

b) If $\tan \theta = \frac{-3}{4}$ and $\frac{\pi}{2} \leq \theta \leq \pi$, find values of $\sin 2\theta$ and $\cos 2\theta$. (5)

c) If two straight lines $A_1x + B_1y + C_1 = 0$ and $A_2x + B_2y + C_2 = 0$ are parallel to each other, prove that $A_1B_2 - A_2B_1 = 0$. (4)

