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 adjA = _____.

(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 $A = \begin{bmatrix} a_{ij} \end{bmatrix}_{3\times4}$ and $B = \begin{bmatrix} b_{ij} \end{bmatrix}_{4\times2}$ 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} + \dfrac{2}{x}\right)^8 = $ _____.

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

j) $12C_5 = $ _____.

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

k) $225° = $ _____ Radian.

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

l) $\dfrac{5\pi}{6} = $ _____ °

(A) 160° (B) 155° (C) 150° (D) 145°

m) $\sec(-1305°) = $ _____.

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

n) $\cos\dfrac{\pi}{2}\sin\dfrac{3\pi}{2}\sin\dfrac{5\pi}{2} = $ _____

(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 $\triangle ABC$, 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 $\left(\dfrac{4x}{5} + \dfrac{5}{2x}\right)^9$.	**(5)**
b)	Using binomial theorem, find the approximate value of $(101)^{\frac{3}{2}}$ and $\dfrac{1}{\sqrt{9.18}}$.	**(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 2A + 3B – 4C = 0.	**(4)**
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 $y = \sin x$ $\left(-\dfrac{\pi}{2} \leq x \leq \dfrac{\pi}{2} \right)$. **(5)**

c) Evaluate: $\tan\left(2\tan^{-1}\dfrac{1}{3} \right)$ **(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 $\dfrac{\cos(90° - A)\cos(180° - A)\tan(180° + A)}{\sin(90° - A)\sin(180° - A)\tan(180° - A)} = 1$. **(5)**

c) Prove that $\tan 57° = \dfrac{\cos 12° + \sin 12°}{\cos 12° - \sin 12°}$. **(4)**

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

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

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

c) If two straight lines $A_1 x + B_1 y + C_1 = 0$ and $A_2 x + B_2 y + C_2 = 0$ are parallel to each other, prove that $A_1 B_2 - A_2 B_1 = 0$. **(4)**