

C.U.SHAH UNIVERSITY

Winter Examination-2018

Subject Name : Basic Mathematics

Subject Code : 2TE01BMT2

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) $AB = \underline{\hspace{2cm}}$ Where $A(-5, 7)$ and $B(7, 2)$.
(A) 13 (B) 169 (C) $\sqrt{29}$ (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) y - intercept of line $2x - 6y + 4 = 0$ is _____.
(A) $-2/3$ (B) $2/3$ (C) -2 (D) 2
- d) Centre of the circle $2x^2 + 2y^2 = 5$ is _____.
(A) $(0, 0)$ (B) $(5, 0)$ (C) $(0, 5)$ (D) $(5/2, 5/2)$
- e) If $\begin{vmatrix} x & -2 \\ 3 & -5 \end{vmatrix} = -4$ then $x = \underline{\hspace{2cm}}$.
(A) $-2/5$ (B) $2/5$ (C) -2 (D) 2
- f) Order of matrix $\begin{bmatrix} 1 & 2 & 5 \\ 2 & 3 & 7 \end{bmatrix}$ is _____.
(A) 2×3 (B) 3×2 (C) 2×2 (D) None of these
- g) If $A = \begin{bmatrix} -8 & 4 \\ -6 & 3 \end{bmatrix}$ then $A^{-1} = \underline{\hspace{2cm}}$.
(A) $\begin{bmatrix} -8 & 4 \\ -6 & 3 \end{bmatrix}$ (B) $\begin{bmatrix} -3 & 4 \\ -6 & 8 \end{bmatrix}$ (C) $\begin{bmatrix} -8 & 6 \\ -4 & 3 \end{bmatrix}$ (D) Does not exist
- h) If $A = \begin{bmatrix} 7 \\ 2 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 4 \end{bmatrix}$ then $A + B = \underline{\hspace{2cm}}$.
(A) $\begin{bmatrix} 10 & 6 \end{bmatrix}$ (B) $\begin{bmatrix} 10 \\ 6 \end{bmatrix}$ (C) $\begin{bmatrix} 21 & 8 \end{bmatrix}$ (D) Not possible
- i) Number of terms in the expansion of $(5x + 7y)^6 = \underline{\hspace{2cm}}$.
(A) 6 (B) 7 (C) 8 (D) 9



- j) ${}^{25}C_{22} = \underline{\hspace{2cm}}$.
 (A) 3200 (B) 2500 (C) 2300 (D) 2100
- k) $240^\circ = \underline{\hspace{2cm}}$ Radian.
 (A) $\frac{4\pi}{3}$ (B) $\frac{3\pi}{4}$ (C) $\frac{4\pi}{5}$ (D) $\frac{5\pi}{4}$
- l) $\frac{5\pi}{3} = \underline{\hspace{2cm}}$.
 (A) 160° (B) 300° (C) 150° (D) 145°
- m) $\tan\left(\frac{21\pi}{4}\right) = \underline{\hspace{2cm}}$
 (A) $\frac{-1}{\sqrt{3}}$ (B) $\frac{1}{\sqrt{3}}$ (C) 1 (D) $\sqrt{3}$
- n) $\sec^2\theta - \tan^2\theta = \underline{\hspace{2cm}}$
 (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) Show that the points (4, 8), (4, 12) and $(4 + 2\sqrt{3}, 10)$ are the vertices of an equilateral triangle. (5)
- b) Find the equation of circle having centre (4, 3) and passing through (7, -2). (5)
- c) Find the 5th term of $\left(x^2 + \frac{1}{x}\right)^6$. (4)

Q-3 Attempt all questions (14)

- a) If $A = \begin{bmatrix} 2 & 3 \\ 1 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 4 & 1 \\ 2 & -3 \end{bmatrix}$ then prove that $(A+B)^T = A^T + B^T$. (5)
- b) If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ then prove that $A^2 - 4A - 5I = O$. (5)
- c) If A(2, 3), B(4, 7) and C(-5, -1) are the vertices of ΔABC , find the length of its median CF. (4)

Q-4 Attempt all questions (14)

- a) Find the constant term of $\left(\sqrt{x} + \frac{2}{x}\right)^{12}$. (5)
- b) Using binomial theorem, find the approximate value of $\sqrt[3]{126}$ and $\sqrt{17}$. (5)
- c) If $A = \begin{bmatrix} 1 & 4 \\ 3 & 2 \\ 2 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & -2 \\ 0 & 5 \\ 3 & 1 \end{bmatrix}$ then find value of $2A - 3B$ and $3A - 2B$. (4)

Q-5 Attempt all questions (14)

- a) Find the equation of straight line passing through (-1, -2) and perpendicular to line $\frac{x}{3} + \frac{y}{4} = 1$. (5)



b) If $A = \begin{bmatrix} -4 & -3 & -3 \\ 1 & 0 & 1 \\ 4 & 4 & 3 \end{bmatrix}$ then find $\text{adj}A$. (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-6 **Attempt all questions** (14)

a) Solve the following equations by matrix method: $2x - y = 4$ and $3x + y = 1$. (5)

b) Draw the graph of $y = \sin x$ ($0 \leq x \leq \pi$). (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)

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

a) Find co ordinates of the points of trisection of the line segment joining points (4, 5) and (13, -4). (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) $\tan 20^\circ + \tan 25^\circ + \tan 20^\circ \tan 25^\circ = 1$ (4)

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

a) Prove that $\frac{\sin\theta + \sin 2\theta + \sin 3\theta}{\cos\theta + \cos 2\theta + \cos 3\theta} = \tan 2\theta$. (5)

b) Prove that $\cos 20^\circ + \cos 60^\circ + \cos 100^\circ + \cos 140^\circ = \frac{1}{2}$. (5)

c) If the centroid of a triangle whose vertices are (-2, 3), (a, 5) and (-1, b) is (5, 5) then find the values of a and b. (4)

