

C. U. SHAH UNIVERSITY

Summer Examination-2020

Subject Name : Basic Mathematics

Subject Code : 2TE01BMT3

Branch: Diploma (All)

Semester : 1

Date : 26/02/2020

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 $P(-5, 7)$ and $Q(7, -2)$ then $PQ =$ _____.
(A) 15 (B) 169 (C) $\sqrt{29}$ (D) None of these
- b) If $(3, 8)$, $(4, 2)$ and $(-1, 5)$ are the vertices of a triangle, then the co-ordinates of its centroid are _____.
(A) $(-2, 5)$ (B) $(5, -2)$ (C) $(2, 5)$ (D) $(5, 2)$
- c) y - intercept of line $2x - 6y + 4 = 0$ is _____.
(A) $2/3$ (B) $3/2$ (C) 2 (D) -2
- d) Centre of the circle $x^2 + y^2 = 5$ is _____.
(A) $(0, 0)$ (B) $(0, 5)$ (C) $(5, 0)$ (D) $\left(\frac{5}{2}, \frac{5}{2}\right)$
- e) If $x + \begin{bmatrix} -3 & 2 \\ 5 & 7 \end{bmatrix} = \begin{bmatrix} -2 & 4 \\ 8 & 11 \end{bmatrix}$ then $x =$ _____.
(A) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ (B) $\begin{bmatrix} -1 & -2 \\ -3 & -4 \end{bmatrix}$ (C) $\begin{bmatrix} -1 & 2 \\ 3 & -4 \end{bmatrix}$ (D) $\begin{bmatrix} 1 & -2 \\ -3 & 4 \end{bmatrix}$
- f) The value of $\begin{vmatrix} 0 & -5 & 3 \\ 0 & 1 & 8 \\ 0 & 2 & 5 \end{vmatrix}$ is _____.
(A) 21 (B) -11 (C) 0 (D) None of these
- g) If $A = \begin{bmatrix} 7 & -3 \\ -2 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 3 \\ 2 & 7 \end{bmatrix}$ then $AB =$ _____.
(A) $\begin{bmatrix} 7 & 0 \\ 0 & 7 \end{bmatrix}$ (B) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ (C) $\begin{bmatrix} 7 & -9 \\ -4 & 7 \end{bmatrix}$ (D) None of these



- h) If $A = \begin{bmatrix} w & x \\ y & z \end{bmatrix}$ then $\text{adj}(\text{adj}A) = \underline{\hspace{2cm}}$.
- (A) $\begin{bmatrix} z & -x \\ -y & w \end{bmatrix}$ (B) $\begin{bmatrix} w & -x \\ -y & z \end{bmatrix}$ (C) $\begin{bmatrix} -w & x \\ y & -z \end{bmatrix}$ (D) $\begin{bmatrix} w & x \\ y & z \end{bmatrix}$
- i) ${}^{14}C_{12} = \underline{\hspace{2cm}}$.
- (A) 156 (B) 19 (C) 91 (D) 119
- j) 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
- k) $330^\circ = \underline{\hspace{2cm}}$ Radian.
- (A) $\frac{6\pi}{11}$ (B) $\frac{11\pi}{6}$ (C) $\frac{22\pi}{6}$ (D) $\frac{13\pi}{6}$
- l) $\frac{\pi}{12} = \underline{\hspace{2cm}}$.
- (A) 15° (B) 12° (C) 25° (D) 10°
- m) $\text{cosec}(-330^\circ) = \underline{\hspace{2cm}}$.
- (A) $\frac{1}{2}$ (B) $-\frac{1}{2}$ (C) -2 (D) 2
- n) $\sin \pi \cdot \sin 2\pi \cdot \sin 3\pi = \underline{\hspace{2cm}}$
- (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) Prove that (12, 8), (-2, 6) and (6, 0) are the vertices of an isosceles right angled triangle. (5)
- b) Find equation of the circle passing through points A(4, 0), B(0, 4) and C(0, 0). (5)
- c) Find the 4th term of $\left(\frac{x}{a} - \frac{a}{x}\right)^{10}$. (4)
- Q-3** **Attempt all questions** (14)
- a) If $A = \begin{bmatrix} -4 & -3 & -3 \\ 1 & 0 & 1 \\ 4 & 4 & 3 \end{bmatrix}$ then prove that $\text{adj}A = A$. (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 CF. (4)
- Q-4** **Attempt all questions** (14)
- a) Find the coefficient of x^{-2} in the expansion of $\left(2x^2 + \frac{1}{2x}\right)^8$. (5)



b) Using binomial theorem, find the approximate value of $\sqrt[3]{128}$ and $\frac{1}{\sqrt{9.18}}$. (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) Find the equation of perpendicular bisector to line joining points $(-1, 2)$ and $(1, -2)$. (5)

b) 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)

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)

$$2A + 3B - 4C = 0.$$

Q-6 Attempt all questions (14)

a) Using matrix method solve: $5x + 3y = 11$ and $3x - 2y = -1$ (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 $A(4, 4)$ and $B(-2, 1)$. (5)

b) Prove that $\frac{\sin(\pi - A) \cot\left(\frac{\pi}{2} - A\right) \cos(2\pi - A)}{\tan(\pi + A) \tan\left(\frac{\pi}{2} + A\right) \sin(-A)} = \sin A$. (5)

c) Prove that $\tan 62^\circ = \frac{\cos 17^\circ + \sin 17^\circ}{\cos 17^\circ - \sin 17^\circ}$. (4)

Q-8 Attempt all questions (14)

a) 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)

b) Prove that $\cos 3\theta = 4 \cos^3 \theta - 3 \cos \theta$. (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)

