Enrollment No: _____ Exam Seat No: _____

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 adj(adjA) = _____.

(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) $14C_{12}$ = _____.

(A) 156 (B) 19 (C) 91 (D) 119

j) Number of terms in the expansion of $\left(\sqrt{x}+\frac{2}{x}\right)^8$ = _____.

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

k) 330° = _____Radian.

(A) $\frac{6\pi}{11}$ (B) $\frac{11\pi}{6}$ (C) $\frac{22\pi}{6}$ (D) $\frac{13\pi}{6}$

l) $\frac{\pi}{12}$ = _____°

(A) 15° (B) 12° (C) 25° (D) 10°

m) $\cos ec\left(-330^\circ\right)$ = _____ .

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

n) $\sin\pi.\sin 2\pi.\sin 3\pi$ = _____

(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 4^{th} 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 adjA = 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 $y=\sin x \quad (0\le x\le \pi)$. **(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 $\frac{\sin(\pi-A)}{\tan(\pi+A)}\frac{\cot\left(\frac{\pi}{2}-A\right)}{\tan\left(\frac{\pi}{2}+A\right)}\frac{\cos(2\pi-A)}{\sin(-A)}=\sin A$. **(5)**

c) Prove that $\tan 62°=\frac{\cos 17°+\sin 17°}{\cos 17°-\sin 17°}$. **(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)**