Enrollment No: _____ Exam Seat No: _____

C. U. SHAH UNIVERSITY

Summer Examination-2020

Subject Name : Basic Mathematics

Subject Code : 2TE01BMT2 **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 d[(x, 1), (8, x)] = 5 then x = _____.
(A) 3 or 6 (B) 4 or 5 (C) 6 or 7 (D) None of these

b) If A(2, –7) and B(8, 3) are the given points, find the midpoint of AB.
(A) $(-2,5)$ (B) $(5,-2)$ (C) $(2,5)$ (D) $(5,2)$

c) Slope of the line 2x – 3y + 4 = 0 is _____.
(A) –2/3 (B) –3/2 (C) 3/2 (D) 2/3

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 = _____.
(A) –2 (B) 2 (C) –5 (D) 5

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} = _____ .
(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 $A=\begin{bmatrix} -5 & 6 \\ 8 & -2 \end{bmatrix}$ then AI = _____.
(A) $\begin{bmatrix} 5 & 6 \\ 8 & 2 \end{bmatrix}$ (B) $\begin{bmatrix} 5 & -6 \\ -8 & 2 \end{bmatrix}$ (C) $\begin{bmatrix} -5 & 6 \\ 8 & -2 \end{bmatrix}$ (D) $\begin{bmatrix} -5 & -6 \\ -8 & -2 \end{bmatrix}$

i) Number of terms in the expansion of $(5x+7y)^7$ = _____.
(A) 7 (B) 8 (C) 9 (D) none of these

j) $10C_5$ = _____.
(A) 252 (B) 225 (C) 525 (D) 522

k) $\frac{3\pi}{4} =$ _____$^\circ$
(A) 165° (B) 155° (C) 145° (D) 135°

l) 150° = _____Radian.
(A) $\frac{6\pi}{5}$ (B) $\frac{5\pi}{6}$ (C) $\frac{2\pi}{3}$ (D) $\frac{3\pi}{2}$

m) $\text{cosec}^2\theta - \cot^2\theta =$ _____
(A) – 1 (B) 0 (C) 1 (D) None of these

n) $\sin\frac{\pi}{3}\cos\frac{\pi}{2}\sin\frac{\pi}{4}\cos\pi =$ _____
(A) 1 (B) –1 (C) 0 (D) None of these

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

Q-2 **Attempt all questions** **(14)**

a) Prove that the points (0, – 3), (1, – 2) and (10, 7) are collinear. **(5)**

b) Find centre and radius of the circle $36x^2 + 36y^2 + 24x - 36y - 23 = 0$. **(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 $A = \begin{bmatrix} 2 & -2 \\ 3 & 1 \end{bmatrix}$, $B = \begin{bmatrix} -1 & 5 \\ 4 & -3 \end{bmatrix}$ then prove that $(AB)' = B'A'$. **(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 BE. **(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 $\sqrt[3]{1003}$ and $\frac{1}{4.95}$. **(5)**

c) If $A = \begin{bmatrix} 2 & 2 & 2 \\ 2 & 1 & -3 \\ 1 & 0 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 3 & 3 & 3 \\ 3 & 0 & 5 \\ 9 & 9 & -1 \end{bmatrix}$ and $C = \begin{bmatrix} 4 & 4 & 4 \\ 5 & -1 & 5 \\ -7 & 8 & -1 \end{bmatrix}$ then find **(4)**
2A – 3B + C.

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 $A=\begin{bmatrix}2 & 1 & 5\\ 0 & 3 & -1\\ 2 & 5 & 0\end{bmatrix}$ then find adjA. **(5)**

c) If $A=\begin{bmatrix}0 & 1\\ -1 & 0\end{bmatrix}$ then prove that A^4 is an identity (unit) matrix. **(4)**

Q-6 **Attempt all questions** **(14)**

a) Solve the following equations by matrix method: **(5)**
2x + 3y = 7 and 4x = 9 + y

b) Draw the graph of $y=\sin x \quad \left(-\frac{\pi}{2}\le x\le\frac{\pi}{2}\right)$. **(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) In which ratio Y – axis divides line segment joining points (3, 5) and (6, 7)? Is division external or internal? Find co-ordinates of the division point. **(5)**

b) Prove that $\frac{\sin\left(\theta-\frac{\pi}{2}\right)}{\cos(\theta-\pi)}+\frac{\tan\left(\frac{\pi}{2}-\theta\right)}{\cot(\pi-\theta)}+\frac{\operatorname{cosec}\left(\frac{\pi}{2}+\theta\right)}{\sec(\pi+\theta)}=-1.$ **(5)**

c) Prove that $\tan 55^\circ=\frac{\cos 10^\circ+\sin 10^\circ}{\cos 10^\circ-\sin 10^\circ}$. **(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) If $\tan\theta=\frac{3}{2}$, $0\le\theta\le\pi$ then find the value of $3\sin\theta+2\cos\theta$. **(5)**

c) Find angle between straight lines $\sqrt{3}x - y + 1 = 0$ and $x - \sqrt{3}y + 2 = 0$. **(4)**