Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Summer Examination-2017

Subject Name : Basic Mathematics

Subject Code : 2TE01BMT3 **Branch: Diploma(All)**

Semester : 1 **Date : 22/03/2017** **Time : 10:30 To 01:30** **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) Centre of the circle $x^2 + y^2 = 25$ is _____ .

(a) $(0,5)$ (b) $(5,0)$ (c) $(0,0)$ (d) None of these

b) If A(– 3, 5) and B(2, – 4) are two points, find slope of AB = _____

(a) –9/5 (b) 9/5 (c) – 5/9 (d) 5/9

c) y – intercept of line 2x – 6y + 4 = 0 is _____.

(a) –2/3 (b) 2/3 (c) –2 (d) 2

d) If A(2, –7) and B(8, 3) then mid point of AB = _____.

(a) $(-2,5)$ (b) $(5,-2)$ (c) $(2,5)$ (d) $(5,2)$

e) 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

f) If $A = \begin{bmatrix} 1 & 3 & 4 \\ 2 & 1 & 2 \end{bmatrix}$ then A^T = _____.

(a) $\begin{bmatrix} 2 & 1 \\ 1 & 3 \\ 2 & 4 \end{bmatrix}$ (b) $\begin{bmatrix} 2 & 1 & 2 \\ 1 & 3 & 4 \end{bmatrix}$ (c) $\begin{bmatrix} 1 & 2 \\ 3 & 1 \\ 4 & 2 \end{bmatrix}$ (d) None of these

g) If $A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ then A^2 = _____.

(a) $\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$ (b) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ (c) $\begin{bmatrix} 0 & -1 \\ -1 & 0 \end{bmatrix}$ (d) $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$

h) 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

i) $12C_5$ = _____

(a) 729 (b) 792 (c) 297 (d) 927

j) Number of terms in the expansion of $\left(\sqrt{x}+\sqrt{y}\right)^7$ = _____.

(a) 7 (b) 8 (c) 9 (d) none of these

k) $\cos^2 51^\circ + \sin^2 39^\circ$ = _____

(a) 1 (b) -1 (c) 0 (d) None of these

l) $\tan\left(\frac{21\pi}{4}\right)$ = _____

(a) $\frac{-1}{\sqrt{3}}$ (b) $\frac{1}{\sqrt{3}}$ (c) 1 (d) $\sqrt{3}$

m) 30° = _____ Radian

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{2}$ (d) $\frac{\pi}{4}$

n) $\frac{\pi}{4}$ Radian = _____ Degree

(a) 60° (b) 30° (c) 45° (d) 90°

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) If $A=\begin{bmatrix}3 & 1\\ -1 & 2\end{bmatrix}$ then prove that $A^2-5A+7I=O$. **(5)**

c) Find middle term of $\left(\frac{x}{2}+\frac{2}{y}\right)^{12}$. **(4)**

Q-3 **Attempt all questions** **(14)**

a) Find equation of a circle passing through points (2, 0), (0, 2) and (0, 0). **(5)**

b) Solve the following equations by matrix method: $3x - 2y = 8$ and $5x + 4y = 6$. **(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-4 **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) Using binomial theorem, find the approximate value of $(102)^{\frac{1}{2}}$ and $\frac{1}{\sqrt[3]{997}}$. **(5)**

c) Prove that $\tan^{-1}\left(\frac{3}{4}\right)+\sin^{-1}\left(\frac{4}{5}\right)=\frac{\pi}{2}$. **(4)**

Q-5 **Attempt all questions** **(14)**

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

b) Find the constant term of $\left(\sqrt{x}+\frac{2}{x}\right)^{12}$. **(5)**

c) If (3, 8), (4, 2) and (–1, 5) are the vertices of a triangle, find the co ordinates of its centroid. **(4)**

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

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

b) Draw the graph of $y=\sin x \quad \left(-\frac{\pi}{2}\le x\le\frac{\pi}{2}\right)$. **(5)**

c) Prove that $\tan 62°=\frac{\cos 17°+\sin 17°}{\cos 17°-\sin 17°}$. **(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 $\frac{\cos A+\cos 3A+\cos 5A}{\sin A+\sin 3A+\sin 5A}=\cot 3A$. **(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-8 **Attempt all questions** **(14)**

a) Prove that $\cos 20°+\cos 60°+\cos 100°+\cos 140°=\frac{1}{2}$. **(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) If A(2, 3), B(4, 7) and C(–5, –1) are the vertices of ΔABC, find the length of its median CF. **(4)**