Enrollment No:-_____ Exam Seat No:-_____

C.U.SHAH UNIVERSITY

Summer-2015

Subject Code:2TE01BMT1 Subject Name:Basic Mathematics

Course Name:Diploma Date :5/4/2015

Semester Marks: 70

Time:10:30 To 01:30

Instructions:

1) Attempt all Questions of both sections in same answer book/Supplementary.
2) Use of Programmable calculator & any other electronic instrument prohibited.
3) Instructions written on main answer book are strictly to be obeyed.
4) Draw neat diagrams & figures (if necessary) at right places.
5) Assume suitable & perfect data if needed.

Q – 1 Do as directed. (14)

(1) $\log_a a$ = _____.

(2) $\log 1 \cdot \log 2 \cdot \log 3$ = _____.

(3) $\log 10 - \log 5$ = _____.

(4) $\log 2 + \log 3$ = _____.

(5) $9C_6$ = _____.

(6) Number of terms in the expansion of $(5x+4)^6$ = _____.

(7) Order of matrix $\begin{bmatrix} 1 & 2 \\ 3 & 1 \\ 4 & 2 \end{bmatrix}$ = _____.

(8) If $A = \begin{bmatrix} 7 \\ 2 \end{bmatrix}$ and $B = [3 \quad 4]$ then A + B = _____.

(9) Magnitude of $3i - 4j - 2k$ = _____.

(10) If $A = i - j + k$ then $\hat{A}$ = _____.

(11) If $a = i + j$ and $b = j - k$ then $a \cdot b$ = _____.

(12) $\sin\frac{\pi}{3} \cos\frac{\pi}{2} \sin\frac{\pi}{4} \cos\pi$ = _____.

(13) $\frac{\pi}{12}$ radian = _____degree.

(14) 60° = _____radian.

Attempt any four

Q – 2

(1) Prove that $\log_m x + \log_{m^2} x^2 + \log_{m^3} x^3 + \log_{m^4} x^4 = 4\log_m x$. (5)

(2) Prove that $\log\left(x + \sqrt{x^2 - 1}\right) + \log\left(x - \sqrt{x^2 - 1}\right) = 0$. (5)

(3) Prove that $\log_y x^2 \log_z y^3 \log_x z^4 = 24$. (4)

Q – 3

(1) Find the constant term of $\left(2x^2 - \frac{1}{x}\right)^6$. (5)

(2) Find the 7th term of $\left(x - \frac{1}{x}\right)^9$. (5)

(3) Find the approximate value of $\frac{1}{\sqrt[3]{997}}$ using binomial theorem. (4)

Q – 4

(1) If $A = \begin{bmatrix} 1 & 4 \\ 3 & 2 \\ 2 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & -2 \\ 0 & 5 \\ 3 & 1 \end{bmatrix}$, find value of 2A – 3B and 3A – 2B. (5)

(2) If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, prove that $A^2 - 5A - 2I = O$. (5)

(3) If $A = \begin{bmatrix} 1 & 2 & 1 \\ 3 & 4 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 3 & -2 & 4 \\ 1 & 5 & 0 \end{bmatrix}$, find matrix X from X + A + B = O. (4)

Q – 5

(1) If $M = \begin{bmatrix} 2 & 3 \\ 0 & 1 \end{bmatrix}$, $N = \begin{bmatrix} 3 & 4 \\ 2 & 1 \end{bmatrix}$, prove that $(MN)^T = N^T M^T$. (5)

(2) Solve the equations using matrix method: $5x + 3y = 11$
$3x - 2y = -1$ (5)

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

Q – 6

(1) Prove that angle between two vectors i + 2j and i + j + 3k is $\sin^{-1}\left(\sqrt{\frac{46}{55}}\right)$. (5)

(2) Forces (1, 2, 3), (– 1, 2, 3) and (– 1, 2, – 3) act on a particles and the particle moves from the point (0, 1, –2) to (– 1, 3, 2). Find the work done by the forces. (5)

(3) If a = 2i + j – k, b = i – j + 2k and c = i – 2j + k ,find the direction cosines of a + b – 2c. (4)

Q – 7

(1) Draw the graph of $y = \cos x\ (0 \le x \le \pi)$. (5)

(2) Prove that $\tan 57^\circ = \frac{\cos 12^\circ + \sin 12^\circ}{\cos 12^\circ - \sin 12^\circ}$ (5)

(3) Prove that $\cos\frac{3\pi}{19} + \cos\frac{7\pi}{19} + \cos\frac{12\pi}{19} + \cos\frac{16\pi}{19} = 0$. (4)

Q – 8

(1) Prove that $\frac{\sin 3A}{\sin A} - \frac{\cos 3A}{\cos A} = 2$. (5)

(2) Prove that $\frac{\cos A + \cos 3A + \cos 5A}{\sin A + \sin 3A + \sin 5A} = \cot 3A$. (5)

(3) 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)