

Enrollment No: _____ Exam Seat No: _____

C.U. SHAH UNIVERSITY

Winter Examination-2020

Subject Name: Basic Mathematics

Subject Code: 2TE01BMT1

Branch: Diploma (All)

Semester: 1

Date: 09/03/2021

Time: 03:00 To 06:00

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) $\log 1 =$ _____.
a) 0 b) e c) 1 d) none of these 1
- b) $\log_e e =$ _____.
a) 3 b) 2 c) 1 d) none of these 1
- c) $\binom{n}{0} =$ _____.
a) nb b) 0 c) 1 d) $n-1$ 1
- d) _____ is a constant term in the expansion of $\left(x + \frac{1}{x}\right)^4$.
a) 7th b) 5th c) 4th d) 3rd 1
- e) Co-efficient of x^3 in the expansion of $(1+x)^3$ is _____.
a) 1 b) 0 c) 4 d) 6 1
- f) If $A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ is a square matrix then $A' =$ _____.
a) $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ b) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ c) $\begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$ d) none of these 1
- g) If $A = \begin{bmatrix} -4 & 2 \\ 3 & -1 \end{bmatrix}$ then $adjA =$ _____.
a) $\begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$ b) $\begin{bmatrix} -1 & -2 \\ -3 & -4 \end{bmatrix}$ c) $\begin{bmatrix} -4 & 2 \\ 3 & -1 \end{bmatrix}$ d) $\begin{bmatrix} -4 & -2 \\ -3 & -1 \end{bmatrix}$ 1



- h) If $\begin{vmatrix} 2 & 1 \\ 1 & 2 \end{vmatrix} = \underline{\hspace{2cm}}$.
 a) 2 b) 0 c) 3 d) 1 1
- i) $\sin^2 30^\circ + \cos^2 30^\circ = \underline{\hspace{2cm}}$.
 a) -1 b) 0 c) 1 d) none of these 1
- j) If $\theta = \frac{\pi}{2}$ then the value of $\sin \theta + \cos \theta = \underline{\hspace{2cm}}$.
 a) 2 b) 0 c) 1 d) -1 1
- k) $\sin \alpha \cos \beta + \cos \alpha \sin \beta = \underline{\hspace{2cm}}$.
 a) $\sin(\alpha + \beta)$ b) $\sin(\alpha - \beta)$ c) $\cos(\alpha + \beta)$ d) $\cos(\alpha - \beta)$ 1
- l) If $\vec{a} = i + 2j + 4k$ then $|\vec{a}| = \underline{\hspace{2cm}}$.
 a) 7 b) 5 c) $\sqrt{21}$ d) none of these 1
- m) If vectors \vec{a} and \vec{b} are perpendicular to each other then $\vec{a} \cdot \vec{b} = \underline{\hspace{2cm}}$.
 a) 1 b) 0 c) -1 d) none of these 1
- n) If $\vec{a} = (1, 0, 2)$ and $\vec{b} = (0, 1, 3)$ then $\vec{a} \cdot \vec{b} = \underline{\hspace{2cm}}$.
 a) 1 b) 7 c) 6 d) None of these 1

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

Q-2 Attempt all questions (14)

- a) Prove that $\log_{10} 800 = 2 + 3 \log_{10} 2$. (05)
- b) Solve: $\frac{4 \log 3 \times \log x}{\log 9} = \log 27$ (05)
- c) Prove that $\log_{y^3} x^2 \log_{z^4} y^3 \log_{x^2} z^4 = 1$. (04)

Q-3 Attempt all questions (14)

- a) If $A = \begin{bmatrix} 1 & -1 \\ 3 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 2 \\ 0 & -1 \end{bmatrix}$ are two matrices then verify that $(AB)^T = B^T A^T$ (05)
- b) Find the inverse of the matrix $A = \begin{bmatrix} 1 & 0 & 1 \\ -1 & 2 & 3 \\ 0 & -3 & 2 \end{bmatrix}$. (05)
- c) If $A = \begin{bmatrix} 1 & -1 \\ 3 & -5 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 3 \\ -2 & -7 \end{bmatrix}$ then find matrix $A + B$ and $A - B$. (04)

Q-4 Attempt all questions (14)

- a) If $A = \begin{bmatrix} 1 & -2 & 3 \\ 2 & 6 & 1 \\ -3 & 0 & 6 \end{bmatrix}$ then find the value of A^2 . (05)



- b) Solve the equations $2x - 3y = 3$ and $5x - 4y = 11$ by using matrix method. (05)
- c) Find the mid term of $(2x + y)^4$. (04)

Q-5 Attempt all questions (14)

- a) Find the co-efficient of x^3 in the expansion of $(x + 3)^6$. (05)
- b) Expand: $(x + 3)^5$ (05)
- c) If the mid term of $\left(\frac{x}{3} + 3\right)^{10}$ is 8064 then find the value of x . (04)

Q-6 Attempt all questions (14)

- a) Find the constant term of $\left(\frac{x}{2} + \frac{1}{x}\right)^8$. (05)
- b) Simplify: $(i + j + k) \cdot [(i - 2j + 2k) \times (i - 2j + k)]$ (05)
- c) Prove that angle between two vectors $i + 2j$ and $i + j + 3k$ is $\sin^{-1} \sqrt{\frac{46}{55}}$. (04)

Q-7 Attempt all questions (14)

- a) Prove that $\sin^2 60^\circ - 3 \tan^2 30^\circ + \cot^2 30^\circ - 3 \operatorname{cosec}^2 60^\circ$. (05)
- b) Forces $F_1 = i + j - k$ and $F_2 = i + 2j - k$ act on a particle under the influence of these forces, particle moves from point $(-3, 1, 2)$ to $(1, 2, 0)$. Find the work done. (05)
- c) If $\vec{a} = (1, 2, 3)$, $\vec{b} = (-1, 0, 3)$ and $\vec{c} = (0, 1, -2)$ then find $\vec{a} + \vec{b} - \vec{c}$ and $|\vec{a} + \vec{b} - \vec{c}|$. (04)

Q-8 Attempt all questions (14)

- a) Prove that $\frac{\sin 7A + \sin 3A}{\cos 3A - \cos 7A} = \cot 2A$. (05)
- b) Draw the graph of $y = \cos x$, $0 \leq x \leq \pi$. (05)
- c) Prove that $\sin^2 \frac{\pi}{4} + \sin^2 \frac{3\pi}{4} + \sin^2 \frac{5\pi}{4} + \sin^2 \frac{7\pi}{4} = 2$ (04)

