

Enrollment No: _____

Exam Seat No: _____

C.U.SHAH UNIVERSITY

Winter Examination-2019

Subject Name: Basic Mathematics

Subject Code: 2TE01BMT1

Branch: Diploma (All)

Semester : 1

Date : 16/11/2019

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) $\log 1 =$ _____.
- a) 0 b) e c) 1 d) none of these
- b) $\log_2 2 =$ _____.
- a) 3 b) 2 c) 1 d) none of these
- c) $\binom{n}{1} =$ _____.
- a) n b) 0 c) 1 d) $n-1$
- d) _____ is a constant term in the expansion of $\left(x + \frac{1}{x}\right)^4$.
- a) 7th b) 5th c) 4th d) 3rd
- e) Co-efficient of x^4 in the expansion of $(1+x)^4$ is _____.
- a) 1 b) 0 c) 4 d) 6
- f) If $A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$ is a square matrix then $A' =$ _____.
- a) $\begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$ b) $\begin{bmatrix} 1 & 2 \\ 1 & 2 \end{bmatrix}$ c) $\begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$ d) none of these



- g) If $A = \begin{bmatrix} -4 & 2 \\ 3 & -1 \end{bmatrix}$ then $\text{adj}A =$ _____.
- 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) $\begin{bmatrix} -4 & -2 \\ -3 & -1 \end{bmatrix}$
- h) If $\begin{vmatrix} 3 & 1 \\ 9 & 3 \end{vmatrix} =$ _____.
- a) 2 b) 0 c) 3 d) 1
- i) $\sin^2 30^\circ + \cos^2 30^\circ =$ _____.
- a) -1 b) 0 c) 1 d) none of these
- j) If $\theta = 0$ then the value of $\sin \theta + \cos \theta =$ _____.
- a) 2 b) 0 c) 1 d) -1
- k) $\sin \alpha \cos \beta + \cos \alpha \sin \beta =$ _____.
- a) $\sin(\alpha + \beta)$ b) $\sin(\alpha - \beta)$ c) $\cos(\alpha + \beta)$ d) $\cos(\alpha - \beta)$
- l) If $\vec{a} = 2i + 3j + 6k$ then $|\vec{a}| =$ _____.
- a) 7 b) 5 c) $\sqrt{45}$ d) none of these
- m) If vectors \vec{a} and \vec{b} are perpendicular to each other then $\vec{a} \cdot \vec{b} =$ _____.
- a) 1 b) 0 c) -1 d) none of these
- n) If $\vec{a} = (2, 1, 0)$ and $\vec{b} = (0, 1, 3)$ then $\vec{a} \cdot \vec{b} =$ _____.
- a) 1 b) 0 c) 3 d) 6

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

Q-2 Attempt all questions

- a) Solve: $\frac{4 \log 3 \times \log x}{\log 9} = \log 27$ (05)
- b) Prove that $\log_{10} 900 = 2 + 2 \log_{10} 3$. (05)
- c) Prove that $\log_{y^2} x^3 \log_{z^3} y^4 \log_{x^4} z^2 = 1$. (04)

Q-3 Attempt all questions

- a) If $A = \begin{bmatrix} 1 & 0 \\ 2 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 0 \\ 0 & 3 \end{bmatrix}$ 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 $A = \begin{bmatrix} 4 & 1 \\ 2 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 7 & 3 \\ 6 & 4 \end{bmatrix}$ then find matrix $A + B$ and $A - B$. (04)



Q-4 Attempt all questions

- a) If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ then find the value of A^2 . (05)
- b) Solve the equations $2x - 3y = 1$ and $5x - 4y = 6$ by using matrix method. (05)
- c) Find the midterm of $(x + 2y)^4$. (04)

Q-5 Attempt all questions

- a) Find the co-efficient of x^3 in the expansion of $(x + 2)^6$. (05)
- b) Expand: $(x - 3)^5$ (05)
- c) If the midterm of $\left(\frac{x}{3} + 3\right)^{10}$ is 8064 then find the value of x . (04)

Q-6 Attempt all questions

- a) Find the constant term of $\left(\frac{x}{2} + \frac{2}{x}\right)^6$. (05)
- b) Simplify: $(i + 2j + 3k) \cdot [(i - 2j + 2k) \times (3i - 2j + k)]$ (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

- a) Prove that $3\sin^2 60^\circ - \frac{3}{4}\tan^2 30^\circ + \frac{4}{3}\cot^2 30^\circ - 2\cos ec^2 60^\circ$. (05)
- b) Forces $F_1 = i + 2j - 3k$ and $F_2 = i - j + 2k$ act on a particle under the influence of these forces, particle moves from point $(3, 1, 2)$ to $(1, 3, -1)$. Find the work done. (05)
- c) If $\bar{a} = (1, 2, 0)$, $\bar{b} = (0, 1, 3)$ and $\bar{c} = (-1, 2, 2)$ then find $\bar{a} + \bar{b} - \bar{c}$ and $|\bar{a} + \bar{b} - \bar{c}|$. (04)

Q-8 Attempt all questions

- a) Prove that $(1 + \tan \theta)^2 + (1 + \cot \theta)^2 = (\sec \theta + \cos ec \theta)^2$. (05)
- b) Draw the graph of $y = \cos x$, $0 \leq x \leq \pi$. (05)
- c) Prove that $\tan^{-1} \frac{5}{7} + \tan^{-1} \frac{1}{6} = \frac{\pi}{4}$ (04)

