

Enrollment No: _____

Exam Seat No: _____

C.U.SHAH UNIVERSITY

Summer Examination-2017

Subject Name: Basic Mathematics

Subject Code: 2TE01BMT1

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) $\log 1 = \underline{\hspace{2cm}}$.

- a) 0 b)
- e
- c) 1 d) none of these

b) $\log_2 8 = \underline{\hspace{2cm}}$.

- a) 3 b) 2 c) 1 d) none of these

c) $\binom{n}{n} = \underline{\hspace{2cm}}$.

- a)
- n
- b) 0 c) 1 d)
- $n-1$

d) _____ is a constant term in the expansion of $\left(x^2 + \frac{1}{x^2}\right)^8$.

- a) 7
- th
- b) 5
- th
- c) 4
- th
- d) 3
- rd

e) Co-efficient of x in the expansion of $(1+x)^4$ is _____.

- a) 1 b) 0 c) 4 d) 6

f) If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ is a square matrix then $A' = \underline{\hspace{2cm}}$.

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

g) If $A = \begin{bmatrix} -1 & 2 \\ 3 & -4 \end{bmatrix}$ then $\text{adj}A = \underline{\hspace{2cm}}$.

- 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 $\begin{vmatrix} x & 1 \\ 9 & 3 \end{vmatrix} = 0$ then $x =$ _____.
- a) 2 b) 0 c) 3 d) 1
- i) $\sec^2 30^\circ - \tan^2 30^\circ =$ _____.
- a) -1 b) 0 c) 1 d) none of these
- j) If $\theta = \frac{\pi}{4}$ then the value of $\sin 2\theta =$ _____.
- a) 2 b) 0 c) 1 d) -1
- k) $\tan^{-1} x + \cot^{-1} x =$ _____.
- a) -1 b) 0 c) 1 d) none of these
- l) If $\vec{a} = i + 2j + 3k$ then $|\vec{a}| =$ _____.
- a) 1 b) 6 c) $\sqrt{14}$ 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 $\log_{10} 800 = 2 + 3 \log_{10} 2$. (05)
- c) Prove that $\log_y (\sqrt[3]{x}) \log_z (y^4) \log_x (\sqrt[4]{z^3}) = 1$. (04)

Q-3 Attempt all questions

- a) If $A = \begin{bmatrix} 2 & -1 \\ 1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 \\ 2 & -1 \end{bmatrix}$ are two matrices then verify that $(AB)^T = B^T A^T$ (05)
- b) Find the inverse of the matrix $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$. (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 $A + 2B$ and $3A - 4B$. (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 $A^2 - 4A$. (05)



b) Solve the equations $3x - 2y = 8$ and $5x + 4y = 6$ by using matrix method. (05)

c) Find the midterm of $(2x + 3y)^8$. (04)

Q-5 Attempt all questions

a) Find the co-efficient of x^6 in the expansion of $(x + 2)^9$. (05)

b) Expand: $(x + 2)^5$ (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 $\left(\frac{x}{3} + \frac{3}{x}\right)^8$. (05)

b) Simplify: $(10i + 2j + 3k) \cdot [(i - 2j + 2k) \times (3i - 2j - 2k)]$. (05)

c) Prove that angle between two vectors $i + 2j$ and $i + j + 3k$ is $\sin^{-1}\left(\sqrt{\frac{46}{55}}\right)$. (04)

Q-7 Attempt all questions

a) Prove that $\sin^2 \frac{\pi}{4} + \sin^2 \frac{3\pi}{4} + \sin^2 \frac{5\pi}{4} + \sin^2 \frac{7\pi}{4} = 2$. (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 $\vec{a} = (2, 1, 0)$, $\vec{b} = (1, -1, 3)$ and $\vec{c} = (-1, 2, 1)$ then find $\vec{a} + 2\vec{b} - 3\vec{c}$ and $|\vec{a} + 2\vec{b} - 3\vec{c}|$. (04)

Q-8 Attempt all questions

a) Prove that $\frac{\sin 2A + \sin 4A + \sin 6A + \sin 8A}{\cos 2A + \cos 4A + \cos 6A + \cos 8A} = \tan 5A$. (05)

b) Draw the graph of $y = \sin x$, $0 \leq x \leq \pi$. (05)

c) Prove that $\tan^{-1} \frac{5}{7} + \tan^{-1} \frac{1}{6} = \frac{\pi}{4}$ (04)

