

Enrollment No: \_\_\_\_\_

Exam Seat No: \_\_\_\_\_

# C.U.SHAH UNIVERSITY

## Winter Examination-2020

Subject Name: Basic Mathematics

Subject Code: 2TE01BMT2/2TE01BMT3

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)** If  $A(2,7)$  and  $B(-4,5)$  then mid-point of  $\overline{AB}$  is \_\_\_\_\_.

- a)  $(-2,12)$     b)  $(-1,6)$     c)  $\left(-\frac{1}{2},3\right)$     d)  $(-2,2)$

**b)** If two straight lines  $y = m_1x + c$  &  $y = m_2x + c$  are parallel then \_\_\_\_\_.

- a)  $m_1m_2 = -1$     b)  $m_1m_2 = 1$     c)  $m_1 = m_2$     d)  $m_1 = -m_2$

**c)** The distance between the points  $(3,4)$  and  $(8,-6)$  is

- a)  $\sqrt{5}$     b)  $5\sqrt{5}$     c)  $\sqrt{55}$     d)  $3\sqrt{5}$

**d)** If  $\begin{vmatrix} x & 3 \\ 0 & -3 \end{vmatrix} = 0$  then  $x =$  \_\_\_\_\_.

- a) 2    b) 0    c) -1    d) 1

**e)** If  $A = \begin{bmatrix} 1 & 0 \end{bmatrix}$  and  $B = \begin{bmatrix} 0 & 1 \end{bmatrix}^T$  then  $AB =$  \_\_\_\_\_.

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

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

- 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)**  $\binom{n}{n-1} =$  \_\_\_\_\_.

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



- h) If  $A = \begin{bmatrix} -1 & 2 \\ 3 & -4 \end{bmatrix}$  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)  $\begin{bmatrix} -4 & -2 \\ -3 & -1 \end{bmatrix}$
- i) \_\_\_\_\_ is a constant term in the expansion of  $\left(2x - \frac{3}{x}\right)^8$ .
- a) 7<sup>th</sup>      b) 5<sup>th</sup>      c) 4<sup>th</sup>      d) 3<sup>rd</sup>
- j) Constant term in the expansion of  $(1-x)^4$  is \_\_\_\_\_.
- a) -1      b) 0      c) 1      d) 4
- k)  $\frac{7\pi}{6}$  Radian = \_\_\_\_\_°.
- a) 310°      b) 210°      c) 420°      d) 30°
- l)  $\sin \alpha \cos \beta - \cos \alpha \sin \beta =$  \_\_\_\_\_.
- a)  $\sin(\alpha + \beta)$       b)  $\sin(\alpha - \beta)$       c)  $\cos(\alpha + \beta)$       d)  $\cos(\alpha - \beta)$
- m) If  $\theta = \frac{\pi}{4}$  then the value of  $\sin \theta + \cos \theta =$  \_\_\_\_\_.
- a) 2      b)  $\sqrt{2}$       c)  $\frac{1}{\sqrt{2}}$       d) -1
- n)  $\tan^2 \theta - \sec^2 \theta =$  \_\_\_\_\_.
- a) -1      b) 0      c) 1      d) none of these

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

**Q-2 Attempt all questions**

- a) In what ratio and at which point does the line  $y = x + 1$  divide the line segment joining the points  $(0,0)$  and  $(2,4)$ ? **(05)**
- b) Find the equation of line passing through the point  $(1,-2)$  and perpendicular to the line passing through the points  $(-1,1)$  and  $(-2,-3)$ . **(05)**
- c) Show that the points  $(1,0), (-1,2)$  and  $(0,1)$  are collinear. **(04)**

**Q-3 Attempt all questions**

- a) If  $A = \begin{bmatrix} 2 & 3 \\ 0 & 1 \end{bmatrix}$  and  $B = \begin{bmatrix} 3 & 4 \\ 2 & 1 \end{bmatrix}$  are two matrices then verify that  $(AB)^T = B^T A^T$  **(05)**
- b) Find the inverse of the matrix  $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 5 \\ 3 & 5 & 6 \end{bmatrix}$ . **(05)**



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 matrix  $A + 2B$  and  $3A - 2B$ . (04)

**Q-4 Attempt all questions**

a) If  $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$  then prove that  $A^2 - 4A - 5I = O$ . (05)

b) Solve the equations  $2x - y = 4$  and  $3x + y = 1$  by using matrix method. (05)

c) Use Binomial theorem to find approximate value of  $\frac{1}{(1.05)^4}$  correct up to three decimal places. (04)

**Q-5 Attempt all questions**

a) Find the co-efficient of  $x^4$  in the expansion of  $(2x + y)^{10}$ . (05)

b) Expand:  $(2x + 3y)^5$  (05)

c) Find the middle term in the binomial expansion of  $\left(\frac{x}{2} - \frac{2}{y}\right)^8$ . (04)

**Q-6 Attempt all questions**

a) Find the constant term of  $\left(x - \frac{1}{x}\right)^{10}$ . (05)

b) Find the centre and radius of the circle  $2x^2 + 2y^2 - 7x - 3y + 1 = 0$ . (05)

c) Find the equation of the circle passing through  $(4, -5)$  and the centre is  $(3, 5)$ . (04)

**Q-7 Attempt all questions**

a) Evaluate: i)  $\sin^2 30^\circ + \cos^2 45^\circ - \operatorname{cosec}^2 60^\circ$   
ii)  $\operatorname{sec}^2 660^\circ - \sin^2 30^\circ$  (05)

b) Draw the graph of  $y = \sin 2x$ ,  $0 \leq x \leq \pi$ . (05)

c) If  $\tan A = \frac{1}{2}$ ,  $\left(0 < A < \frac{\pi}{2}\right)$  and  $\tan B = \frac{1}{3}$  then find the value of  $\tan(A + B)$ . (04)

**Q-8 Attempt all questions**

a) Prove that  $\frac{\sin 7A + \sin 3A}{\cos 3A - \cos 7A} = \cot 2A$ . (05)

b) If  $\tan(A + B) = 3$  and  $\tan(A - B) = 5$  then find  $\tan 2A$  and  $\tan 2B$ . (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)**

