

C.U.SHAH UNIVERSITY

Summer Examination-2018

Subject Name : Basic Mathematics

Subject Code : 2TE01BMT3

Branch: Diploma (All)

Semester : 1

Date : 21/03/2018

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) If $A(-5, 7)$ and $B(7, -2)$ then $AB = \underline{\hspace{2cm}}$.
 (A) 15 (B) 169 (C) $\sqrt{29}$ (D) None of these
- b) If $A(1, 7)$ and $B(3, 3)$ are the given points, then the midpoint of AB is $\underline{\hspace{2cm}}$.
 (A) $(-2, 5)$ (B) $(5, -2)$ (C) $(2, 5)$ (D) $(5, 2)$
- c) y – intercept of line $3x + 2y - 7 = 0$ is $\underline{\hspace{2cm}}$.
 (A) $7/2$ (B) $-7/2$ (C) $7/3$ (D) $-7/3$
- d) Radius of the circle $x^2 + y^2 = 25$ is $\underline{\hspace{2cm}}$.
 (A) 5 (B) 25 (C) $5/2$ (D) None of these
- e) If $A = \begin{bmatrix} 1 & 3 & 4 \\ 2 & 1 & 2 \end{bmatrix}$ then $A^T = \underline{\hspace{2cm}}$.
 (a) $\begin{bmatrix} 2 & 1 \\ 1 & 3 \\ 2 & 4 \end{bmatrix}$ (b) $\begin{bmatrix} 2 & 1 & 2 \\ 1 & 3 & 4 \end{bmatrix}$ (c) $\begin{bmatrix} 1 & 2 \\ 3 & 1 \\ 4 & 2 \end{bmatrix}$ (d) None of these
- f) If $A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ then $A^2 = \underline{\hspace{2cm}}$.
 (a) $\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$ (b) $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ (c) $\begin{bmatrix} 0 & -1 \\ -1 & 0 \end{bmatrix}$ (d) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$
- g) Order of matrix $\begin{bmatrix} 1 & 2 & 5 \\ 2 & 3 & 7 \end{bmatrix}$ is $\underline{\hspace{2cm}}$.
 (a) 2×3 (b) 3×2 (c) 2×2 (d) None of these
- h) If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ then $\text{adj}A = \underline{\hspace{2cm}}$.
 (A) $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$ (B) $\begin{bmatrix} -a & b \\ c & -d \end{bmatrix}$ (C) $\begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$ (D) $\begin{bmatrix} d & b \\ c & a \end{bmatrix}$



- i) ${}^{14}C_{12} = \underline{\hspace{2cm}}$
 (A) 156 (B) 19 (C) 91 (D) 119
- j) Number of terms in the expansion of $(x + y)^6 = \underline{\hspace{2cm}}$.
 (A) 4 (B) 5 (C) 6 (D) 7
- k) $\frac{\pi}{6}$ Radian = $\underline{\hspace{2cm}}$ Degree
 (a) 30° (b) 90° (c) 120° (d) 150°
- l) $330^\circ = \underline{\hspace{2cm}}$ Radian.
 (A) $\frac{6\pi}{11}$ (B) $\frac{11\pi}{6}$ (C) $\frac{22\pi}{6}$ (D) $\frac{13\pi}{6}$
- m) $\sin^2 51^\circ + \cos^2 39^\circ = \underline{\hspace{2cm}}$
 (a) 1 (b) -1 (c) 0 (d) None of these
- n) $\sin \pi \cdot \sin 2\pi \cdot \sin 3\pi = \underline{\hspace{2cm}}$
 (a) -1 (b) 1 (c) 0 (d) None of these

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

Q-2 Attempt all questions (14)

- a) Prove that the points $(0, -3)$, $(1, -2)$ and $(10, 7)$ are collinear. (5)
- b) If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ then prove that $A^2 - 4A - 5I = O$. (5)
- c) Find the approximate value of $\sqrt[3]{1003}$ using binomial theorem. (4)

Q-3 Attempt all questions (14)

- a) Find equation of a circle passing through points $(1, 0)$, $(0, 1)$ and $(0, 0)$. (5)
- b) Using matrix method solve: $5x + 3y = 11$ and $3x - 2y = -1$. (5)
- c) If $A = \begin{bmatrix} 2 & 3 & 6 \\ -1 & 2 & 5 \end{bmatrix}$, $B = \begin{bmatrix} 0 & 2 & -8 \\ 2 & 4 & -2 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & 3 & -3 \\ 1 & 4 & 1 \end{bmatrix}$ then prove that $2A + 3B - 4C = O$. (4)

Q-4 Attempt all questions (14)

- a) If $A = \begin{bmatrix} 2 & 3 \\ 1 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 4 & 1 \\ 2 & -3 \end{bmatrix}$ then prove that $(A + B)^T = A^T + B^T$. (5)
- b) Find the middle term of $\left(\frac{x}{2} + \frac{2}{y}\right)^{12}$. (5)
- c) Prove that $\tan^{-1}\left(\frac{1}{2}\right) + \tan^{-1}\left(\frac{1}{3}\right) = \frac{\pi}{4}$. (4)

Q-5 Attempt all questions (14)

- a) If $A = \begin{bmatrix} 2 & 1 & 5 \\ 0 & 3 & -1 \\ 2 & 5 & 0 \end{bmatrix}$ then find $\text{adj}A$. (5)
- b) Find the 4th term of $\left(\frac{x}{a} - \frac{a}{x}\right)^{10}$. (5)



- c) If (3, 8), (4, 2) and (-1, 5) are the vertices of a triangle, find the co ordinates of its centroid. (4)

Q-6

Attempt all questions

(14)

- a) Find the equation of straight line passing through (3, 4) and parallel to line (5)

$$\frac{x}{2} + \frac{y}{2} = 1.$$

- b) Draw the graph of $y = \sin x$ ($0 \leq x \leq \pi$). (5)

- c) Prove that $\tan 5A - \tan 3A - \tan 2A = \tan 5A \cdot \tan 3A \cdot \tan 2A$ (4)

Q-7

Attempt all questions

(14)

- a) Find co ordinates of the points of trisection of the line segment joining points A(4, 5) and B(13, - 4). (5)

- b) Prove that $\frac{\sin \theta + \sin 2\theta + \sin 3\theta}{\cos \theta + \cos 2\theta + \cos 3\theta} = \tan 2\theta$. (5)

- c) If $A = \begin{bmatrix} 1 & 2 & 0 \\ -3 & 0 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 0 & -1 & -3 \\ 3 & 2 & 4 \end{bmatrix}$ then solve the equation (4)

$$2(X + A) + 3B = 0.$$

Q-8

Attempt all questions

(14)

- a) Prove that $\frac{\sin(\pi + \theta)}{\sin(2\pi - \theta)} + \frac{\tan\left(\frac{\pi}{2} + \theta\right)}{\cot(\pi - \theta)} + \frac{\cos(2\pi + \theta)}{\sin\left(\frac{\pi}{2} + \theta\right)} = 3$. (5)

- b) If $\tan \theta = \frac{1}{2}$, prove that $7 \cos 2\theta + 8 \sin 2\theta = \frac{53}{5}$. (5)

- c) If radius of a circle $x^2 + y^2 - 4x - 8y + k = 0$ is 4, find k. (4)

