

VNR11M

Virudhunagar District Common Examinations  
Common Second Mid Term Test - November 2022

## Standard 11 MATHEMATICS

Time: 1.30 Hrs.

Marks: 50

### Part - I

Answer all the questions:

10×1=10

- 1) If A is a square matrix, then which of the following is not symmetric?  
a)  $A+A^T$       b)  $AA^T$       c)  $A^T A$       d)  $A-A^T$
- 2) If  $A+I = \begin{bmatrix} 3 & -2 \\ 4 & 1 \end{bmatrix}$ , then  $(A+I)(A-I)$  is equal to  
a)  $\begin{bmatrix} -5 & -4 \\ 8 & -9 \end{bmatrix}$       b)  $\begin{bmatrix} -5 & 4 \\ -8 & 9 \end{bmatrix}$       c)  $\begin{bmatrix} 5 & 4 \\ 8 & 9 \end{bmatrix}$       d)  $\begin{bmatrix} -5 & -4 \\ -8 & -9 \end{bmatrix}$
- 3) If  $\begin{bmatrix} 4 & 3 \\ -2 & x \end{bmatrix}$  is singular then the value of x is  
a)  $\frac{3}{2}$       b)  $-\frac{3}{2}$       c) 3      d) -2
- 4) The value of m for which the vectors  $3\hat{i} - 6\hat{j} + \hat{k}$  and  $2\hat{i} - 4\hat{j} + \lambda\hat{k}$  are parallel is  
a)  $\frac{2}{3}$       b)  $\frac{3}{2}$       c)  $\frac{5}{2}$       d)  $\frac{2}{5}$
- 5) If  $|\vec{a}| = 13$ ,  $|\vec{b}| = 5$  and  $\vec{a} \cdot \vec{b} = 60^\circ$  then  $|\vec{a} \times \vec{b}|$  is  
a) 15      b) 35      c) 45      d) 25
- 6) The vectors  $\vec{a} - \vec{b}$ ,  $\vec{b} - \vec{c}$ ,  $\vec{c} - \vec{a}$  are  
a) parallel to each other      b) unit vectors  
c) mutually perpendicular vectors      d) coplanar vectors
- 7) If  $\vec{a}$  and  $\vec{b}$  having same magnitude and angle between them is  $60^\circ$  and their scalar product is  $\frac{1}{2}$  then  $|\vec{a}|$  is  
a) 2      b) 3      c) 7      d) 1
- 8)  $\lim_{x \rightarrow \infty} \frac{a^x - b^x}{x}$  is  
a)  $\log ab$       b)  $\log\left(\frac{a}{b}\right)$       c)  $\log\left(\frac{b}{a}\right)$       d)  $\frac{a}{b}$
- 9) At  $x = \frac{3}{2}$  the function  $f(x) = \frac{2x-3}{2x-3}$  is  
a) continuous      b) discontinuous      c) differentiable      d) non-zero
- 10)  $\lim_{x \rightarrow 0} \frac{xe^x - \sin x}{x}$  is  
a) 1      b) 2      c) 3      d) 0

### Part - II

Answer any FOUR questions. Q.No. 16 is compulsory:

4×2=8

- 11) Find  $|\vec{a} \times \vec{b}|$ , where  $\vec{a} = 3\hat{i} + 4\hat{j}$  and  $\vec{b} = \hat{i} + \hat{j} + \hat{k}$ .
- 12) If  $\vec{a} = 2\hat{i} + 2\hat{j} + 3\hat{k}$ ,  $\vec{b} = -\hat{i} + 2\hat{j} + \hat{k}$  and  $\vec{c} = 3\hat{i} + \hat{j}$  be such that  $\vec{a} + \lambda\vec{b}$  is perpendicular to  $\vec{c}$ , then find  $\lambda$ .
- 13) Find the area of the triangle whose vertex are (0, 0), (1, 2) and (4, 3).
- 14) Find the value of  $\lim_{x \rightarrow 0} \frac{\tan 2x}{x}$ .
- 15) If the function  $f(x) = \frac{\sin x}{x^2}$  examine the continuity.

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- 16) Construct the matrix  $A = [a_{ij}]_{3 \times 3}$  where  $a_{ij} = i - j$  state whether A is symmetric or skew - symmetric.

## Part - III

Answer any FOUR questions. Q.No. 22 is compulsory:

4×3=12

17) Determine the roots of the equation  $\begin{vmatrix} 1 & 4 & 20 \\ 1 & -2 & 5 \\ 1 & 2x & 5x^2 \end{vmatrix} = 0$ .

18) If  $\cos 2\theta = 0$ , determine  $\begin{vmatrix} 0 & \cos \theta & \sin \theta \\ \cos \theta & \sin \theta & 0 \\ \sin \theta & 0 & \cos \theta \end{vmatrix}^2$ .

- 19) If D and E are the mid points of the sides AB and AC of a triangle ABC, prove that  $\vec{BE} + \vec{DC} = \frac{3}{2}\vec{BC}$ .

- 20) Show that the points (4, -3, 1), (2, -4, 5) and (1, -1, 0) form a right angled triangle.

- 21) Find the vectors of magnitude  $10\sqrt{3}$  that are perpendicular to the plane which contains  $\hat{i} + 2\hat{j} + \hat{k}$  and  $\hat{i} + 3\hat{j} + 4\hat{k}$ .

- 22) If f and g are continuous functions with  $f(3) = 5$  and  $\lim_{x \rightarrow 3} [2f(x) - g(x)] = 4$  find  $g(3)$ . (6)

## Part - IV

Answer all the questions.

4×5=20

- 23) Show that the vectors  $5\hat{i} + 6\hat{j} + 7\hat{k}$ ,  $7\hat{i} - 8\hat{j} + 9\hat{k}$ ,  $3\hat{i} + 20\hat{j} + 5\hat{k}$  are coplanar. (OR)

If  $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ x & 2 & y \end{bmatrix}$  is a matrix such that  $AA^T = 9I$  find the value of x and y.

24) Prove that  $\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix} = abc \left(1 + \frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right)$ . (OR)

Find the value of  $\lim_{x \rightarrow \infty} x \left[ 3^{\frac{1}{x}} + 1 - \cos\left(\frac{1}{x}\right) - e^{\frac{1}{x}} \right]$

25) Using factor theorem, Prove that  $\begin{vmatrix} b+c & a-c & a-b \\ b-c & c+a & b-a \\ c-b & c-a & a+b \end{vmatrix} = 8abc$  (OR)

If  $\vec{a}$ ,  $\vec{b}$ ,  $\vec{c}$  are three vectors such that  $\vec{a} + 2\vec{b} + \vec{c} = 0$  and  $|\vec{a}| = 3$ ,  $|\vec{b}| = 4$ ,  $|\vec{c}| = 7$

find the angle between  $\vec{a}$  and  $\vec{b}$ .

- 26) The medians of a triangle are concurrent - prove. (OR)

If ABCD is a quadrilateral and E and F are the midpoints of AC and BD respectively, then prove that  $\vec{AB} + \vec{AD} + \vec{CB} + \vec{CD} = 4\vec{EF}$ .

Kindly send me your district question papers to our whatsapp number: 7358965593