

Ts11M

Tenkasi District



Common Second Mid Term Test - 2023

24-11-2023

Standard 11

Time: 1.30 Hrs.

MATHEMATICS

Marks: 45

I. Answer all the questions:**10×1=10**

- 1) If A and B are symmetric matrices of order n, where $(A \neq B)$ then
- a) A+B is skew-symmetric b) A+B is symmetric
c) A+B is diagonal matrix d) A+B is zero matrix
- 2) The value of the determinant if $A = \begin{bmatrix} 0 & a & -b \\ -a & 0 & c \\ b & -c & 0 \end{bmatrix}$ is
- a) $-2abc$ b) abc c) 0 d) $a^2+b^2+c^2$
- 3) If $A = \begin{bmatrix} \lambda & 1 \\ -1 & -\lambda \end{bmatrix}$, then the value of λ , $A^2 = 0$
- a) 0 b) ± 1 c) -1 d) 1
- 4) The value of $\overline{AB} + \overline{BC} + \overline{DA} + \overline{CD}$ is
- a) \overline{AD} b) \overline{CA} c) $\overline{0}$ d) $-\overline{AD}$
- 5) If $\vec{r} = \frac{9\vec{a} + 7\vec{b}}{16}$, then the point P whose position vector \vec{r} divides the line joining the points with position vectors \vec{a} and \vec{b} in the ratio
- a) 7:9 internally b) 9:7 internally c) 9:7 externally d) 7:9 externally
- 6) If $|\vec{a} + \vec{b}| = 60$, $|\vec{a} - \vec{b}| = 40$ and $|\vec{b}| = 46$, then $|\vec{a}|$ is
- a) 42 b) 12 c) 22 d) 32
- 7) If the projection of $5\vec{i} - \vec{j} - 3\vec{k}$ on the vector $\vec{i} + 3\vec{j} + \lambda\vec{k}$ is same as the projection of $\vec{i} + 3\vec{j} + \lambda\vec{k}$ on $5\vec{i} - \vec{j} - 3\vec{k}$, then λ is equal to
- a) ± 4 b) ± 3 c) ± 5 d) ± 1
- 8) $\lim_{x \rightarrow \infty} \frac{\sin x}{x}$
- a) 1 b) 0 c) ∞ d) $-\infty$
- 9) $\lim_{x \rightarrow \infty} \frac{a^x - b^x}{x} =$
- a) $\log(ab)$ b) $\log\left(\frac{a}{b}\right)$ c) $\log\left(\frac{b}{a}\right)$ d) $\frac{a}{b}$
- 10) $\lim_{x \rightarrow 0} \frac{\sin Px}{\tan 3x} = 4$, then the value of P is
- a) 6 b) 9 c) 12 d) 4

II. Answer any 4 questions. Question No. 15 is compulsory:**4×2=8**

- 11) Find x, y, a and b if $\begin{bmatrix} 3x + 4y & 6 & x - 2y \\ a + b & 2a - b & -3 \end{bmatrix} = \begin{bmatrix} 2 & 6 & 4 \\ 5 & -5 & -3 \end{bmatrix}$

$$12) \text{ S.T. } \begin{vmatrix} 0 & c & b \\ c & 0 & a \\ b & a & 0 \end{vmatrix} = \begin{vmatrix} b^2 + c^2 & ab & ac \\ ab & c^2 + a^2 & bc \\ ab & bc & a^2 + b^2 \end{vmatrix}$$

13) If G is centroid of ΔABC , P.T. $\overline{GA} + \overline{GB} + \overline{GC} = \vec{0}$

14) If $|\vec{a} + \vec{b}| = |\vec{a} - \vec{b}|$, P.T. \vec{a} and \vec{b} are perpendicular

15) Find the positive integer n so that $\lim_{x \rightarrow 3} \frac{x^n - 3^n}{x - 3} = 27$

III. Answer any 4 questions. Qn.No. 20 is compulsory:

4x3=12

16) Calculate $\lim_{x \rightarrow \infty} \frac{x^3 + 2x + 3}{5x^2 + 1}$

17) If \vec{a}, \vec{b} are unit vectors and θ is the angle between them S.T. $\sin \frac{\theta}{2} = \frac{1}{2} |\vec{a} - \vec{b}|$

18) Find the angle between the vectors $2\vec{i} + \vec{j} - \vec{k}$ and $\vec{i} + 2\vec{j} + \vec{k}$ using vector product.

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

20) If (K, 2) (2, 4) and (3, 2) are vertices of the triangle of area 4 sq.units then determine the value of K.

IV. Answer the following questions:

3x5=15

21) Show that $\begin{vmatrix} 1 & 1 & 1 \\ x & y & z \\ x^2 & y^2 & z^2 \end{vmatrix} = (x-y)(y-z)(z-x)$ using factor theorem.

(OR)

Prove that $\lim_{\theta \rightarrow 0} \frac{\sin \theta}{\theta} = 1$

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22) Show that points whose position vectors $4\vec{i} - 5\vec{j} + \vec{k}$, $-\vec{j} - \vec{k}$, $3\vec{i} + 9\vec{j} + 4\vec{k}$ and $-4\vec{i} + 4\vec{j} + 4\vec{k}$ are coplanar.

(OR)

The medians of triangle are concurrent.

23) Express the matrix $\begin{bmatrix} 3 & 3 & -1 \\ -2 & -2 & 1 \\ -4 & -5 & 2 \end{bmatrix}$ as the sum of symmetric matrix and skew symmetric matrix.

(OR)

Calculate the value of $\lim_{x \rightarrow 0} \frac{\sqrt{1 + \sin x} - \sqrt{1 - \sin x}}{\tan x}$