Ts11M

Tenkasi District

Common Second Mid Term Test - 2024

29-11-24.

Standard 11

MATHEMATICS

Time: 1.30 Hrs. Marks: 45

I. Choose the best: **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^TA d) $A-A^T$

2) If the points (x, −2), (5, 2), (8, 8) are collinear, then x = ?
a) −3 b) $\frac{1}{3}$ c) 1 d) 3

3) If $A=\begin{vmatrix}-1 & 2 & 4\\ 3 & 1 & 0\\ -2 & 4 & 2\end{vmatrix}$ and $B=\begin{vmatrix}-2 & 4 & 2\\ 6 & 2 & 0\\ -2 & 4 & 8\end{vmatrix}$ then B is given by
a) B = 4A b) B = −4A c) B = −A d) B = 6A

4) Let A and B be two symmetric matrices of same order, then which one of the following statement is not true?
a) A+B is a symmetric matrix b) AB is symmetric matrix
c) $AB = (BA)^T$ d) $A^TB = AB^T$

5) The unit vector parallel to the resultant of the vectors $\vec{i}+\vec{j}-\vec{k}$ and $\vec{i}-2\vec{j}+\vec{k}$ is
a) $\frac{\vec{i}-\vec{j}+\vec{k}}{\sqrt{5}}$ b) $\frac{2\vec{i}+\vec{j}}{\sqrt{5}}$ c) $\frac{2\vec{i}-\vec{j}+\vec{k}}{\sqrt{5}}$ d) $\frac{2\vec{i}-\vec{j}}{\sqrt{5}}$

6) If $|\vec{a}+\vec{b}|=60$, $|\vec{a}-\vec{b}|=40$ and $|\vec{b}|=46$, then $|\vec{a}|$ =?
a) 42 b) 12 c) 22 d) 32

7) If (1, 2, 4) and (2, −3λ, −3) are the initial and terminal points of the vector $\vec{i}+5\vec{j}-7\vec{k}$ then λ = ?
a) $\frac{7}{3}$ b) $\frac{-7}{3}$ c) $\frac{-5}{3}$ d) $\frac{5}{3}$

8) If $\vec{a}=\vec{i}+2\vec{j}+2\vec{k}$, $|\vec{b}|=5$ and the angle between $\vec{a}$ and $\vec{b}$ is $\frac{\pi}{6}$, then the area if triangle formed by these vectors as two sides, is
a) $\frac{7}{4}$ b) $\frac{15}{4}$ c) $\frac{3}{4}$ d) $\frac{17}{4}$

9) $\lim_{x\to\infty}\frac{a^x-b^x}{x}=$
a) log ab b) $\log\left(\frac{a}{b}\right)$ c) $\log\left(\frac{b}{a}\right)$ d) $\frac{a}{b}$

10) The value of $\lim_{x\to0}\frac{\sin x}{\sqrt{x^2}}=$
a) 1 b) −1 c) 0 d) ∞

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

11) Evaluate: $\lim_{x\to 2}\dfrac{x^4-16}{x-2}$

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

13) Determine the value of X+Y if $\begin{bmatrix} 2X+Y & 4X \\ 5x-7 & 4X \end{bmatrix} = \begin{bmatrix} 7 & 7Y-13 \\ Y & X+6 \end{bmatrix}$.

14) If G is the centroid of the ΔABC, prove that $\overrightarrow{GA}+\overrightarrow{GB}+\overrightarrow{GC}=\vec{0}$.

15) Find the projection of the vector $\vec{i}+3\vec{j}+7\vec{k}$ on the vector $2\vec{i}+6\vec{j}+3\vec{k}$.

III. Answer any four questions. Q.No. 20 is compulsory: **4×3=12**

16) Evaluate: $\lim_{x\to 0}\dfrac{\sqrt{1+\sin x}-\sqrt{1-\sin x}}{\tan x}$

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

18) For any vector $\vec{a}$ prove that $|\vec{a}\times\vec{i}|^2+|\vec{a}\times\vec{j}|^2+|\vec{a}\times\vec{k}|^2=2|\vec{a}|^2$.

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: **3×5=15**

21) Express the matrix $A=\begin{bmatrix} 1 & 3 & 5 \\ -6 & 8 & 3 \\ -4 & 6 & 5 \end{bmatrix}$ as the sum of a symmetric and a skew - symmetric matrices.

(OR)

Prove that $\lim_{\theta\to 0}\dfrac{\sin\theta}{\theta}=1$.

22) Show that the function $\begin{cases} \dfrac{x^3-1}{x-1}, & \text{if } x\neq 1 \\ 3, & \text{if } x=1 \end{cases}$ is continuous on $(-\infty, \infty)$.

(OR)

Prove that the medians of a triangle are concurrent.

23) Show that the vectors $\vec{i}-2\vec{j}+3\vec{k}$, $-2\vec{i}+3\vec{j}-4\vec{k}$, $-\vec{j}+2\vec{k}$ are coplanar.

(OR)

Using factor theorem prove that $\begin{vmatrix} b+c & a-c & a-b \\ b-c & c+a & b-a \\ c-b & c-a & a+b \end{vmatrix} = 8abc$.
