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THIRUNELVELI DISTRICT.

SECOND MID TERM TEST - NOVEMBER 2018

STANDARD - XI

MATHEMATICS

TIME: 1.15 hrs

MARKS:45

10 x 1 = 10

I. Choose the correct Answer.

1. If $A = \begin{bmatrix} 1 & -1 \\ 2 & -1 \end{bmatrix}$, $B = \begin{bmatrix} a & 1 \\ b & -1 \end{bmatrix}$ and $(A+B)^2 = A^2 + B^2$, then the values of "a" and "b" are
 a) $a = 4, b = 1$ b) $a = 1, b = 4$ c) $a = 0, b = 4$ d) $a = 2, b = 4$
2. If $A = \begin{bmatrix} 1 & a \\ 0 & 1 \end{bmatrix}$ then $A^3 =$
 a) $\begin{bmatrix} 1 & a^3 \\ 0 & 1 \end{bmatrix}$ b) $\begin{bmatrix} 1 & 3a \\ 1 & 0 \end{bmatrix}$ c) $\begin{bmatrix} 1 & 3a \\ 0 & 1 \end{bmatrix}$ d) $\begin{bmatrix} 1 & 0 \\ a^3 & 1 \end{bmatrix}$
3. The value of determinant of $A = \begin{bmatrix} 0 & a & -b \\ -a & 0 & c \\ b & -c & 0 \end{bmatrix}$ is
 a) $-2abc$ b) abc c) 0 d) $a^2 + b^2 + c^2$
4. One of the diagonals of parallelogram ABCD with \vec{a} and \vec{b} as adjacent is $\vec{a} + \vec{b}$. The other diagonal \vec{BD} is
 a) $\vec{a} - \vec{b}$ b) $\vec{b} - \vec{a}$ c) $\vec{a} + \vec{b}$ d) $\frac{\vec{a} + \vec{b}}{2}$
5. If \vec{a} and \vec{b} are two vectors of magnitude 2 and inclined at an angle 60° , then the angle between \vec{a} and $\vec{a} + \vec{b}$ is
 a) 30° b) 60° c) 45° d) 90°
6. $a = 3\vec{i} + 2\vec{j} + 9\vec{k}$ and $b = \vec{i} + \lambda\vec{j} + 3\vec{k}$ are parallel vectors then the value of λ is
 a) 6 b) $\frac{3}{2}$ c) $\frac{2}{3}$ d) $\frac{1}{6}$
7. $\vec{a} = 3\vec{i} + 4\vec{j}$ and $\vec{b} = \vec{i} + \vec{j} + \vec{k}$ then the value of $|\vec{a} \times \vec{b}| =$
 a) $\sqrt{14}$ b) 5 c) 0 d) $\sqrt{26}$
8. $\lim_{x \rightarrow \pi/2} \frac{2x - \pi}{\cos x} =$
 a) 2 b) 1 c) -2 d) 0
9. $\lim_{x \rightarrow 0} \frac{e^{\sin x} - 1}{x} =$
 a) 1 b) e c) $\frac{1}{e}$ d) 0
10. $\lim_{x \rightarrow \infty} \left[1 + \frac{k}{x} \right]^x =$
 a) e b) 1 c) e^k d) 0

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PART - B

II. Answer Four Questions:-
Qn. No: 16 is Compulsory

4x2=8

11. For what value of x, the matrix $A = \begin{bmatrix} 0 & 1 & -2 \\ -1 & 0 & x^3 \\ 2 & -3 & 0 \end{bmatrix}$ is skew - symmetric.

12. Evaluate: $\begin{vmatrix} x+2a & y+2b & z+2c \\ x & y & z \\ a & b & c \end{vmatrix}$

13. Show that the point whose position vectors are $2\vec{i} + 3\vec{j} - 5\vec{k}$, $3\vec{i} + \vec{j} - 2\vec{k}$ and $6\vec{i} - 5\vec{j} + 7\vec{k}$ are collinear.

14. Evaluate: $\lim_{x \rightarrow 1} \frac{x^m - 1}{x^n - 1}$, m and n are integers.

15. Do the limit of the function $\frac{\sin|x|}{x}$ exist as $x \rightarrow 0$? state reasons for your answer.

16. $|\vec{a}| = 5$, $|\vec{b}| = 6$, $|\vec{c}| = 7$ and $\vec{a} + \vec{b} + \vec{c} = \vec{0}$ then find the value of $\vec{a} \cdot \vec{b} + \vec{b} \cdot \vec{c} + \vec{c} \cdot \vec{a}$

PART - C

III. Answer Four Questions:-
Qn. No: 22 is Compulsory

4x3=12

17. using factors theorem prove that $\begin{vmatrix} 1 & 1 & 1 \\ x & y & x \\ x^2 & y^2 & z^2 \end{vmatrix} = (x - y)(y - z)(z - x)$

18. Show that $\begin{vmatrix} a^2 + x^2 & ab & ac \\ ab & b^2 + x^2 & bc \\ ac & bc & c^2 + x^2 \end{vmatrix}$ is divisible by x^4

19. Prove that the points whose position vectors $2\vec{i} + 4\vec{j} + 3\vec{k}$, $4\vec{i} + \vec{j} + 9\vec{k}$ and $10\vec{i} - \vec{j} + 6\vec{k}$ form a right angled triangle.

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

21. Prove that $\lim_{x \rightarrow 0} \frac{\log(1+x)}{x} = 1$

22. Evaluate: $\lim_{x \rightarrow 0} \frac{3^x - 1}{\sqrt{1+x} - 1}$

PART - D

IV. Answer all the Questions:-

23. If $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$ and $A^3 - 6A^2 + 7A + KI = O$, find the values of "K"

3x5=15
[Or]

If $A = \begin{bmatrix} \frac{1}{2} & \alpha \\ 0 & \frac{1}{2} \end{bmatrix}$, prove that $\sum_{k=1}^n \det[A^k] = \frac{1}{3} \left[1 - \frac{1}{4^n} \right]$

24. Prove by vector method the medians of a triangle are concurrent [Or]
Find the cosine and sine angle between the vectors $\vec{a} = 2\vec{i} + \vec{j} + 3\vec{k}$ and

$\vec{b} = 4\vec{i} - 2\vec{j} + 2\vec{k}$
25. Prove that $\lim_{x \rightarrow 0} \frac{x^n - a^n}{x - a} = n \cdot a^{n-1}$

[Or]

Evaluate: $\lim_{x \rightarrow \pi/2} [1 + \cos x]^{3 \sec x}$

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