INFINITY THINK BEYOND.....

AN EDUCATIONAL INSTITUTE

XII MIND CURVE Mid Term Maths Test Series 2025-26

Test 05

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S no	Syllabus Covered	Chapters (In Half Yearly)	Marking Scheme
1.	Chapter 10	Vector	18
2	Chapter 11	Three dimensional	22

Note: Students/Teachers can refer to this Sample Paper for practice purpose. However, students may find or experience different exam pattern as syllabus or marking scheme may vary school to school.

MM:40 | Time1.5Hrs

GENERAL INSTRUCTIONS

READ CAREFULLY ALL INSTRUCTIONS

1. **This Question Paper has 5 Sections A, B, C, D and E.**
2. **Section A has 10 MCQs carrying 1 mark each**
3. **Section B has 3 questions carrying 02 marks each.**
4. **Section C has 2 questions carrying 03 marks each.**
5. **Section D has 2 case based integrated units of assessment (04 marks each) with sub parts of the values of 1, 1 and 2 marks each respectively.**
6. **Section E has 2 questions carrying 05 marks each**
7. **All Questions are compulsory.**
8. **This paper consists of 19 questions.**
   a. **Write your answers neatly and legibly.**
   b. **Ensure you have not left any question unanswered**

SECTION – A

Questions 1 to 10 carry 1 mark each.

1. The lines $\vec{r} = \hat{\imath} + \hat{\jmath} - \hat{k} + \lambda(2\hat{\imath} + 3\hat{\jmath} - 6\hat{k})$ *and* $\vec{r} = 2\hat{\imath} - \hat{\jmath} + \hat{k} + \mu(6\hat{\imath} + 9\hat{\jmath} - 18\hat{k})$ are

(a) coincident (b) skew (c) intersecting (d) parallel

2. The equation of the line in vector from passing through the point (-1,3,5) and parallel to the line $\frac{x-3}{2} = \frac{y-4}{3}$, $z = 2$ is

(a) $\vec{r} = -\hat{\imath} + 3\hat{\jmath} + 5\hat{k} + t(2\hat{\imath} + 3\hat{\jmath} + \hat{k}$

(b) $\vec{r} = -\hat{\imath} + 3\hat{\jmath} + 5\hat{k} + t(2\hat{\imath} + 3\hat{\jmath}))$

(c) $\vec{r} = 2\hat{\imath} + 3\hat{\jmath} - 2\hat{k} + t(-\hat{\imath} + 3\hat{\jmath} + 5\hat{k})$

(d)) $\vec{r} = 2\hat{\imath} + 3\hat{\jmath} + t(-\hat{\imath} + 3\hat{\jmath} + 5\hat{k})$

3. If the position vectors of P and Q are $\hat{\imath} + 3\hat{\jmath} - 7\hat{k}$ and $5\hat{\imath} - 2\hat{\jmath} + 4\hat{k}$ respectively ,then the cosine of the angle between $\overrightarrow{PQ}$ and y – axis is

(a) $\frac{4}{\sqrt{162}}$ (b) $\frac{11}{\sqrt{162}}$ (c) $\frac{5}{\sqrt{162}}$ (d) $-\frac{5}{\sqrt{162}}$

4. The number of vectors of unit length perpendicular to the vectors $\vec{a} = 2\hat{\imath} + \hat{\jmath} + 2\hat{k}$ and $\vec{b} = \hat{\jmath} + \hat{k}$

(a) Three (b) Infinite (c) Two (d) One

5. Let $\vec{a}$, $\vec{b}$, $\vec{c}$ be three unit vectors such that I $\vec{a}+\vec{b}+\vec{c}$ I = 1 and $\vec{a}$ is perpendicular to $\vec{b}$ .If $\vec{c}$ makes angle α *and* β with $\vec{a}$ *and* $\vec{b}$ respectively , then cos α + cos β =

(a) -1 (b) $\frac{3}{2}$ (c) - $\frac{3}{2}$ (d) 1

6. The equations of a line are 5x – 3 = 15 y + 7 = 3 –10z. The direction cosines of the line are

(a) $\frac{6}{7}$, $\frac{2}{7}$, $\frac{-3}{7}$ (b) $\frac{-12}{15}$, $\frac{4}{15}$, $\frac{-6}{15}$

(c) $\frac{1}{7}$, $\frac{2}{7}$, $\frac{-3}{7}$ (d) 6,2,-3

7. The Cartesian equation of the line which passes through the point (-2, 4, -5) and is parallel to the line $\frac{x+3}{3}=\frac{4-y}{5}=\frac{z+8}{6}$

(a) $\frac{x-2}{3}=\frac{y+4}{-5}=\frac{z+5}{6}$ (b) $\frac{x+2}{-3}=\frac{y-4}{5}=\frac{z+5}{-6}$

(c) $\frac{x-2}{3}=\frac{y-4}{5}=\frac{z+5}{6}$ (d) $\frac{x-2}{-3}=\frac{y-5}{6}=\frac{z+5}{-5}$

8. If $|\vec{a}|$ =10 , $|\vec{b}|$ =2 and $\vec{a}.\vec{b}$ =12 then the value of $|\vec{a}\times\vec{b}|$

(a)5 (b)10 (c)15 (d)20

Question numbers 9 and 10 are Assertion and Reason based questions

Two statements are given, one labelled as Assertion (A) and the other is labelled as Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

(b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).

(c) Assertion (A) is true, but Reason (R) is false.

(d) Assertion (A) is false, but Reason (R) is true.

9. **Assertion (A):** Acute angle between the vectors $\hat{\imath}+\hat{\jmath}$ - k and $2\hat{\imath}$ + 3k is $\cos^{-1}\left(\frac{1}{\sqrt{39}}\right)$

Reason (R): For vectors $\vec{a}$ and $\vec{b}$, the acute angle between them is, $\cos^{-1}\left(\frac{|\vec{a}.\vec{b}|}{|\vec{a}||\vec{b}|}\right)$.

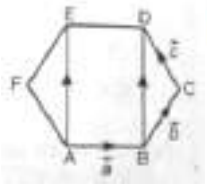
10. **Assertion (A):** Projection vector of $\vec{a}$ along $\vec{b}$ is given by. $\left(\frac{\vec{a}.\vec{b}}{|\vec{b}|^2}\right)\vec{b}$

Reason (R) : Projection vector of $\vec{a}$ along $\vec{b}$ is $\frac{\vec{a}.\vec{b}}{|\vec{b}|}$

SECTION – B

Questions 11 to 13 carry 2 mark each.

11.(A) ABCDEF is a regular hexagon, $\overrightarrow{AB}=\vec{a}$, $\overrightarrow{BC}=\vec{b}$ and $\vec{C}D=\vec{c}$, find $\overrightarrow{AE}$



OR

(B) Find λ and μ if $(2\,\hat{\imath}+6\,\hat{\jmath}+\widehat{27k}\,)\times(\,\hat{\imath}-\lambda\hat{\imath}+\mu\,\hat{\jmath}\,)=0$

12. Three vectors $\vec{a}$, $\vec{b}$ and $\vec{c}$ satisfy the condition $\vec{a}+\vec{b}+\vec{c}=\vec{0}$. Evaluate the quantity $\mu=\vec{a}.\vec{b}+\vec{b}.\vec{c}+\vec{c}.\vec{a}$, if $|\vec{a}|=3,|\vec{b}|=4$ and$|\vec{c}|=2$.

13.(A) If $\vec{a}=2\hat{\imath}$ - $\hat{\jmath}$ and $\vec{b}=3\hat{\imath}+2\hat{k}$, find $|\vec{a}+\vec{b}|$.

OR

(B) If $\vec{a}$ and $\vec{b}$ are two vectors such that $|\vec{a}|=|\vec{b}|=\sqrt{2}$ and $\vec{a}\,.\,\vec{b}$ = -1 , find the angle between $\vec{a}$ *and* $\vec{b}$.

SECTION – C
Questions 14 to 15 carry 3 mark each

14. (A) If $\vec{a}$ and $\vec{b}$ are unit vectors ,then what is the angle between $\vec{a}$ *and* $\vec{b}$ so that $\sqrt{2}\,\vec{a} - \vec{b}$ is a unit vector ?

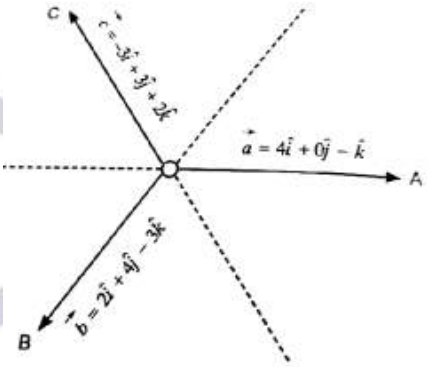
OR

(B) If $\vec{a}$, $\vec{b}$ and $\vec{c}$ are mutually perpendicular vectors of equal magnitude ,then prove that the vector $(2\vec{a} + \vec{b} + 2\vec{c})$ is equally inclined to both $\vec{a}$ and $\vec{c}$.Also ,find angle between $\vec{a}$ and $(2\vec{a} + \vec{b} + 2\vec{c})$.

15. Find the values of P so that the line $\frac{1-x}{3} = \frac{7y-14}{2p} = \frac{z-3}{2}$ and $\frac{7-7x}{3p} = \frac{y-5}{1} = \frac{6-z}{5}$

SECTION – D
Questions 16 to 17 carry 4 mark each.

16. Teams A, B, C went for playing a tug of war game Teams A, B, C have attached a rope to a metal ring and is trying to pull the ring into their own area (team areas shown in the figure)



Team A pulls along vector $\vec{a}$ =$4\hat{\imath}$ -$\hat{k}$

Team B pulls along vector $\vec{b}$ = $2\hat{\imath}$ +$4\hat{\jmath}$ -$3\hat{k}$

Team C pulls along vector $\vec{c}$ = $3\hat{\imath}$ +$3\hat{\jmath}$ -$2\hat{k}$

(i)What are the direction cosines of line along which team A pulls?

(ii)What is the magnitude of teams taken together.

(iii)(a)Find the unit vector $\perp$ r to both $\vec{b}$ and $\vec{c}$

OR

(b)Find the area of the triangle formed by $\vec{a}$ & $\vec{b}$

17. The flight path of two airplanes in a flight simulator game are shown here. The coordinates of the airports P (-2, 1, 3) and Q (3, 4, -1) are given. Aeroplane 1 flies directly from P to Q Airplane 2 has a layover at R and then flies to Q.The path of Airplane 2 from P to R can be represented by the vector $5\hat{\imath} + \hat{\jmath} - 2\hat{k}$(Note: Assume that the flight path is straight and fuel is consumed uniformly throughout the flight.

(i)Find the vector that represents the flight path of Airplane 1.

(ii)Find the vector representing the path of Airplane 2 from R to Q.

(iii)(a) Find the angle between the flight paths of Airplane 1 and Airplane 2 just after take off?

OR

(b) Consider that Airplane 1 started the flight with a full fuel tank. Find the position vector of the point where one third of the fuel runs out if the entire fuel is required for the flight.

SECTION – E
Questions 18 to 19 carry 5 mark each.

18.(A) Find the vector and Cartesian equations of the lines which is perpendicular to the lines with equations $\frac{x+2}{1} = \frac{y-3}{2} = \frac{z+1}{4}$ *and* $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ and passes through the point (1, 1, 1). Also find the angle between the given lines.

OR

(B) Show that the lines $\frac{x-2}{1} = \frac{y-2}{3} = \frac{z-3}{1}$ and $\frac{x-2}{1} = \frac{y-3}{4} = \frac{z-4}{2}$ intersect . Also, find the coordinates of the point of intersection.

19. Find the value of 't' for which the following lines are perpendicular to each other :

$\frac{x-5}{5t+2} = \frac{2-y}{5} = \frac{1-z}{-1}$; $\frac{x}{1} = \frac{y+\frac{1}{2}}{2t} = \frac{z-1}{3}$ .Hence ,find whether the lines intersect or not .