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SIIIS 193 B-14
B.Sc. IIIrd Semester Degree Examination
Mathematics
(Vectors and Solid Geometry)
Paper - 3.1

Time : 3 Hours Maximum Marks : 60

Instructions to Candidates:

*Answer **all** the sections and compulsory mention the sections.*

SECTION-A

I. Answer any Ten of the following: **(10×2=20)**

1. Find $\vec{a}\times(\vec{b}\times\vec{c})$ where $\vec{a}=i+2j,\ \vec{b}=j+2k,\ \vec{c}=i+2k$.
2. Show that $(\vec{a}\times\vec{b})\times(\vec{c}\times\vec{d})=[\vec{a}\,\vec{b}\,\vec{d}]\vec{c}-[\vec{a}\,\vec{b}\,\vec{c}]\vec{d}$
3. If $\vec{a},\vec{b},\vec{c}$ and $\vec{a},\vec{b},\vec{c}$ are reciprocal system of vectors Then P.T. $\vec{a}\vec{a'}=\vec{b}\vec{b'}=\vec{c}\vec{c'}=1$
4. Find the locus of a point which is equidistant from (1,2,3) and(3,2,-1).
5. Find the centroid of a triangle ABC where A(2,2,-1), B(2,0,3) and C(2,1,-5).
6. Using the concept of direction ratio's show that the points A(5,11,-6), B(3,5,-2) and C(2,2,0) are collinear
7. Find the area of Δ^{le} whose vertices are (2,5,-4), (-1,4,-3), and (4,7,-6).
8. Find the angle between pair planes 6x-3y-2z-7=0, x+2y+2z+9=0.
9. Find the perpendicular distance of the point (1,-1,3) from the plane 5x+2y-7z+9=0.
10. Find the angle between the line $\frac{x+1}{2}=\frac{y}{3}=\frac{z-3}{6}$ and the plane 3x+y+z=7.

11. Find the equation of plane passing through the point (2,3,4) and parallel to the plane 5x-6y+7z=3

12. Show that the lines $\frac{x-1}{2}=\frac{y-2}{2}=\frac{z-3}{1}$ and $\frac{x-2}{3}=\frac{y-2}{2}=\frac{z-6}{4}$ are coplanar.

SECTION-B

II. Answer any Two of the following **(2×5=10)**

1. Show that the vector $\vec{a}\times(\vec{b}\times\vec{c}),\vec{b}\times(\vec{c}\times\vec{a})$ and $\vec{c}\times(\vec{a}\times\vec{b})$ are coplanar.

2. If $\vec{a},\vec{b},\vec{c}$ are three non coplanar vectors Then express $\vec{b}\times\vec{c}$ interms of $\vec{a},\vec{b},\vec{c}$.

3. Find the unit vector coplanar with $\vec{a}$ and $\vec{b}$ perpendicular to $\vec{c}$ where $\vec{a}=i-j+2k,\ \vec{b}=2i+j-3k,$ and $\vec{c}=i+2j-k$

SECTION-C

III. Answer any Three of the following **(3×5=15)**

1. The direction cosines of the two lines which are connected by the relation $l-5m+3n=0$ and $7l^2+5m^2-3n^2=0$

2. Find a and b such that the points (a,1,1),(1,b,-1) and (2,3,-3) are collinear.

3. A line makes angles $\alpha,\beta,\gamma,\delta$ with four diagonals of a cube show that $\cos^2\alpha+\cos^2\beta+\cos^2\gamma+\cos^2\delta=\frac{4}{3}$.

4. Find the projection of AB and CD where A=(3,4,5),B(4,6,3),C(-1,2,4) and D=(1,0,5).

SECTION-D

IV. Answer any Three of the following. **(3×5=15)**

1. Derive the plane passing through a point and parallel to the given lines (both vector and cartisian form).

2. Find the equation of the plane passing through a point (2,2,1), (9,3,6) and perpendicular to the plane 2x+6y+6z=9.

3. Find the foot of the $\perp^r$ from a point (-2,7,-1) on the plane $3x-4y+z+9=0$

4. Find the equation of the plane containing the line $\frac{x+1}{2}=\frac{y+2}{3}=\frac{z-3}{4}$ and perpendicular to the plane $x-2y+3z=4$.
