(a) $\underline{u} \times \underline{v}$ (b) $|\underline{u} \times \underline{v}|$ (c) $\frac{1}{2}(\underline{u} \times \underline{v})$ (d) ✔ $\frac{1}{2}|\underline{u} \times \underline{v}|$

216. The scalar triple product of $\underline{a}$, $\underline{b}$ and $\underline{c}$ is denoted by

(a) $\underline{a}.\underline{b}.\underline{c}$ (b) ✔ $\underline{a}.\underline{b} \times \underline{c}$ (c) $\underline{a} \times \underline{b} \times \underline{c}$ (d) $(\underline{a} + \underline{b}) \times \underline{c}$

217. Cross product or vector product is defined

(b) In plane only (b) ✔ in space only (c) everywhere (d) in vector field

218. If $\underline{u}$ and $\underline{v}$ are two vectors, then $\underline{u} \times \underline{v}$ is a vector

(b) Parallel to $\underline{u}$and $\underline{v}$ (b) parallel to $\underline{u}$ (c) ✔ perpendicular to $\underline{u}$ and $\underline{v}$ (d) orthogonal to $\underline{u}$

219. If $\underline{u}$ and $\underline{v}$ be any two vectors, along the adjacent sides of ||gram then the area of ||gram is

(b) $\underline{u} \times \underline{v}$ (b) ✔ $|\underline{u} \times \underline{v}|$ (c) $\frac{1}{2}(\underline{u} \times \underline{v})$ (d) $\frac{1}{2}|\underline{u} \times \underline{v}|$

220. If $\underline{u}$ and $\underline{v}$ be any two vectors, along the adjacent sides of triangle then the area of triangle is

(b) $\underline{u} \times \underline{v}$ (b) $|\underline{u} \times \underline{v}|$ (c) $\frac{1}{2}(\underline{u} \times \underline{v})$ (d) ✔ $\frac{1}{2}|\underline{u} \times \underline{v}|$

221. Two non zero vectors are perpendicular iff

(a) $\underline{u}.\underline{v} = 1$ (b) $\underline{u}.\underline{v} \neq 1$ (c) $\underline{u}.\underline{v} \neq 0$ (d) ✔ $\underline{u}.\underline{v} = 0$

222. The scalar triple product of $\underline{a}$, $\underline{b}$ and $\underline{c}$ is denoted by

(b) $\underline{a}.\underline{b}.\underline{c}$ (b) ✔ $\underline{a}.\underline{b} \times \underline{c}$ (c) $\underline{a} \times \underline{b} \times \underline{c}$ (d) $(\underline{a} + \underline{b}) \times \underline{c}$

223. The vector triple product of $\underline{a}$, $\underline{b}$ and $\underline{c}$ is denoted by

(a) $\underline{a}.\underline{b}.\underline{c}$ (b) $\underline{a}.\underline{b} \times \underline{c}$ (c) ✔ $\underline{a} \times \underline{b} \times \underline{c}$ (d) $(\underline{a} + \underline{b}) \times \underline{c}$

224. Notation for scalar triple product of $\underline{a}$, $\underline{b}$ and $\underline{c}$ is

(a) $\underline{a}.\underline{b} \times \underline{c}$ (b) $\underline{a} \times \underline{b}.\underline{c}$ (c)$[\underline{a}.\underline{b}.\underline{c}]$ (d) ✔ all of these

225. If the scalar product of three vectors is zero, then vectors are

(a) Collinear (b) ✔ coplanar (c) non coplanar (d) non-collinear

226. If any two vectors of scalar triple product are equal, then its value is equal to

(a) 1 (b) ✔0 (c) -1 (d) 2

227. Moment of a force $\underline{F}$ about a point is given by:

(a) Dot product (b) ✔cross product (c) both (a) and (b) (d) None of these

Q.NO.2

1. $x = at^2, y = 2at$ represent the equation of parabola $y^2 = 4ax$
2. Express the perimeter P of square as a function of its area A.
3. Show that $x = a\cos\theta$, $y = b\sin\theta$ represent the equation of ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$
4. Show that: $\sinh 2x = 2\sinh x \cosh x$

   Express the volume V of a cube as a function of the area A of its base.
5. Find $\frac{f(a+h)-f(a)}{h}$ and simplify $f(x) = \cos x$
6. $f(x) = \frac{1}{\sqrt{x-1}}, x \neq 1$; $g(x) = (x^2 + 1)^2$
7. (a) $f^{-1}(x)$ (b) $f^{-1}(-1)$ and verify $f(f^{-1}(x)) = f^{-1}f(x)) = xf(x) = \frac{2x+1}{x-1}, x > 1$
8. Show that $\lim_{x\to 0} \frac{a^x - 1}{x} = \log_e a$
9. Evaluate $\lim_{x\to 0} \frac{Sin7x}{x}$
10. Evaluate $\lim_{n\to+\infty} \left(1 + \frac{1}{n}\right)^{\frac{n}{2}}$
11. $\text{Lim}_{h\to 0} \frac{\sqrt{x+h}-\sqrt{x}}{h}$
12. $\text{Lim}_{x\to 0}(1 + 2x^2)^{\frac{1}{x^2}}$
13. Evaluate $\lim_{\theta\to 0} \frac{1-cos\theta}{\theta}$
14. Evaluate $\lim_{x\to 0} \frac{x^n - a^n}{x^m - a^m}$

15. $\text{Lim}_{x\to 0}\frac{e^{1/x}-1}{e^{1/x}+1}, x>0$
16. (i) $\text{Lim}_{x\to 0}\frac{\sin x^0}{x}$ (ii) $\text{Lim}_{\theta\to 0}\frac{1-\cos\theta}{\sin\theta}$ (iii) $\text{Lim}_{x\to 0}\frac{\sin ax}{\sin bx}$
17. Discuss the continuity of the function at $x=3$ $g(x)=\frac{x^2-9}{x-3}$ $if\ x\neq 3$
18. Discuss the continuity of $f(x)$ at $x=c$. $f(x)=\begin{cases}2x+5 & if\ x\leq 2\\ 4x+1 & if\ x>2\end{cases}$, $c=2$
19. Discuss the continuity of $f(x)$ at 3, when $f(x)=\begin{cases}x-1, & if\ x\leq 3\\ 2x+1 & if\ 3\leq x\end{cases}$
20. Find the derivative of the given function by definition $f(x)=x^2$
21. Find the derivative of the given function by definition $f(x)=\frac{1}{\sqrt{x}}$
22. Find the derivative of $y=\left(2\sqrt{x}+2\right)(x-\sqrt{x})$ $w.r.t\ 'x'$
23. Differentiate $\frac{2x^3-3x^2+5}{x^2+1}$ $w.r.t\ 'x'$
24. If x^4+2x^2+2, Prove that $\frac{dy}{dx}=4x\sqrt{y-1}$
25. Differentiate $\left(\sqrt{x}-\frac{1}{\sqrt{x}}\right)^2$ $w.r.t\ 'x'$.
26. Differentiate $(x-5)(3-x)$
27. Find $\frac{dy}{dx}$ if $x=\theta+\frac{1}{\theta}, y=\theta+1$
28. Find $\frac{dy}{dx}$ by making some suitable substitution if $y=\sqrt{x+\sqrt{x}}$
29. Differentiate $x^2+\frac{1}{x^2}$ $w.r.t\ x-\frac{1}{x}$
30. Find $\frac{dy}{dx}$ if $y^2-xy-x^2+4=0$
31. Find $\frac{dy}{dx}$ if $x^2+y^2=4$
32. Find $\frac{dy}{dx}$ if $y=x^n$ where $n=\frac{p}{q}, q\neq 0$
33. If $y=(ax+b)^n$ where n is negative integer , find $\frac{dy}{dx}$ using quotient theorem.
34. Find $\frac{dy}{dx}$ if $xy+y^2=2$
35. Differentiate $\left(1+x^2\right)$ $w.r.t\ x^2$
36. Find $\frac{dy}{dx}$ if $3x+4y+7=0$
37. Find $\frac{dy}{dx}$ $if\ \ y=xcosy$
38. Differentiate sin^2x $w.r.t\ cos^2x$
39. Find $f'(x)$ if $f(x)=ln(e^x+e^{-x})$
40. Find $f'(x)$ if $f(x)=e^x\ (1+lnx)$
41. Differentiate $(lnx)^x$ $w.r.t\ 'x'$
42. Find $\frac{dy}{dx}$ if $y=a^{\sqrt{x}}$
43. Find $\frac{dy}{dx}$ if $y=5e^{3x-4}$
44. Find $\frac{dy}{dx}$ if $y=(x+1)^x$
45. Find $\frac{dy}{dx}$ if $y=xe^{sinx}$
46. Find $\frac{dy}{dx}$ if $y=(ln\ tanhx)$
47. Find $\frac{dy}{dx}$ if $y=sinh^{-1}(\frac{x}{2})$
48. Find $\frac{dy}{dx}$ if $y=tanh^{-1}(sinx)$ $, -\frac{\pi}{2}<x<\frac{\pi}{2}$
49. If $y=Sin^{-1}\frac{x}{a}$, then show that $y_2=x\left(a^2-x^2\right)^{-\frac{3}{2}}$
50. Find y_2 if $y=x^2.e^{-x}$
51. Find y_2 if $x=acos\theta, y=sin\theta$
52. Find y_2 if $x^3-y^3=a^3$
53. Find the first four derivatives of $cos(ax+b)$

54. Apply Maclaurin's Series expansion to prove that $e^{2x} = 1 + 2x + \frac{4x^2}{2!} + \frac{8x^3}{3!} + \cdots$
55. Apply Maclaurin's Series expansion to prove that $e^x = 1 + x + \frac{x^2}{2!} + \cdots$
56. State Taylor's series expansion.
57. Expand $cosx$ by Maclaurin's series expansion.
58. Define Increasing and decreasing functions.
59. Determine the interval in which $f(x) = x^2 + 3x + 2; x \in [-4, 1]$
60. Determine the interval in which $f(x) = Cos\,x\,; x \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$
61. Find the extreme values of the function $f(x) = 3x^2 - 4x + 5$
62. Find the extreme values of the function $f(x) = 1 + x^3$
63. Find δy and dy if $y = x^2 + 2x$ when x changes from 2 to 1.8
64. Use differentials find $\frac{dy}{dx}$ and $\frac{dx}{dy}$ in the following equations.
65. $xy + x = 4$ (b) $xy - lnx = c$
66. Find the approximate increase in the volume of a cube if the length of its each edge changes from 5 to 5.02
67. Find the approximate increase in the area of a circular disc if its diameter is increased form 44cm to 44.4cm.

Q.NO.3

1. Find dy in $y = x^2 + 2x$ when x changes from 2 to 1.8 .
2. If $xy + x = 4$, find $\frac{dx}{dy}$ by using differentials.
3. Using differentials find $\frac{dx}{dy}$ $xy - \ln x = c$.
4. Use differential to approximate the value of $\cos 29°$
5. Evaluate $\tan^2 \int xdx$.
6. Find $\int a^{x^2} xdx$
7. Evaluate $\int \cos 3x \sin 2x dx$.
8. Evaluate $\int \frac{ax+b}{ax^2+2bx+c} dx$
9. Evaluate $\int \sqrt{1 - \cos 2x} dx$, $(1 - \cos 2x) > 0$.
10. Evaluate $\int \frac{\sec^2 x}{\sqrt{\tan x}} dx$
11. Evaluate $\int \frac{e^{2x}+e^x}{e^x} dx$
12. Integrate by substitution $\int \frac{-2x}{\sqrt{4-x^2}} dx$.
13. Find the integral $\int \frac{\cos x}{\sin x \ln(\sin x)} dx$
14. Evaluate $\int \frac{1}{x \ln x} dx$.
15. Evaluate $\int \frac{2x}{1-\sin x} dx$
16. Evaluate $\int \frac{e^x(1-x)}{(2+x)^2} dx$
17. Evaluate $\int x \ln x dx$
18. Evaluate $\int \frac{3-x}{1-x+6x^2} dx$
19. Evaluate $\int_{-1}^{3} (x^3 + 3x^2) dx$.
20. $\int_0^{\frac{\pi}{6}} x \cos x dx$
21. Solve the differential equations $\frac{dy}{dx} = \frac{y^2+1}{e^{-x}}$.
22. Write two properties of definite integral.
23. Find the area between the x-axis and curve $y = 4x - x^2$

24. Solve the differential equation $\frac{x^2+1}{y+1} = \frac{x}{y}\frac{dy}{dx}$
25. Evaluate $\int \frac{1}{\sqrt{x+1}-\sqrt{x}}dx$
26. Evaluate $\int \frac{dx}{x(\ln 2x)^3} x > 0$
27. Evaluate $\int x^5 \ln x dx$
28. Evaluate $\int \frac{2a}{a^2-x^2}dx, x < a$
29. Evaluate $\int_{-1}^{2} [x + |x|]dx$
30. Evaluate $\int_0^3 \frac{dx}{x^2+9}$
31. Evaluate $\int \tan^{-1} x dx$
32. Evaluate $\int_2^{\sqrt{5}} x\sqrt{x^2-1}dx$
33. Evaluate $\int \frac{e^{\tan^{-1}x}}{1+x^2}dx$
34. Evaluate $\int x^2 \ln x dx$
35. Evaluate integral $\int x \cdot \sin x dx$
36. Find indefinite integral $\int e^{ax}\left[a\sec^{-1}x + \frac{1}{x\sqrt{x^2-1}}\right]dx$
37. Evaluate $\int \frac{5x+8}{(x+3)(2x-1)}dx$ by using partial fraction
38. Solve $x^2(2y+1)\frac{dy}{dx} - 1 = 0$.
39. Show that $y = \tan(e^x + c)$ is solution of $\frac{dy}{dx} = \frac{y^2+1}{e^{-x}}$
40. Evaluate $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \cos t dt$.
41. What is differential coefficient?
42. Define Definite integral.
43. Define integral
44. Calculate the integral $\int_0^{\frac{\pi}{4}} \sec x(\sec x + \tan x)dx$.
45. If $\int_{-2}^{1} f(x)dx = 5, \int_{-2}^{1} g(x)dx = 4$ then Evaluate $\int_{-2}^{1}[3f(x) - 2g(x)]dx$
46. Show that the points $A(3,1), B(-2,-3)$ and $C(2,2)$ are vertices of an isosceles triangle.
47. Find the mid-point of the line segment joining the vertices $A(-8,3), B(2,-1)$.
48. Show that the vertices $(-1,2)$, $B(7,5), C(2,-6)$ are vertices of a right triangle.
49. Find the points trisecting the join of $A(-1,-4)$ and $B(6,2)$.
50. Find h such that $(-1,h)$, $B(3,2), and\ C(7,3)$ are collinear.
51. Describe the location in the plane of point $P(x,y)$ for whcih $x = y$.
52. The point $C(-5,3)$ is the centre of a circle and $P(7,-2)$ lies on the circle. What is the radius of the circle?
53. Find the point three-fifth of the way along the line segment from $A(-5,8)$ to $B(5,3)$.
54. The two points P and O' are given in xy −coordinate system. Find the XY-coordinates of P referred to the translated axes $O'X$ and $O'Y$ if $P(-2,6)$ and $O'(-3,2)$.
55. The xy-coordinate axes are translated through point O' whose coordinates are given in xy −coodinate system. The coordinates of P are given in the XY −coodinate system. Find the coordinates of P in xy-coordiante system if $(-5,-3)$, $O'(-2,3)$.
56. What are translated axes.
57. Show that the points $A(-3,6), B(3,2)$ and $C(6,0)$ are collinear.
58. Find an equation of the straight line if its slope is 2 and $y - axis$ is 5.
59. Find the slope and inclination of the line joining the points $(-2,4); (5,11)$
60. Find k so that the line joining $A(7,3); B(k,-6)$ and the line joining $C(-4,5); D(-6,4)$ are perpendicular.
61. Find an equation of the line bisecting the I and III quadrants.
62. Find an equation of the line for $x - intercept: -3$ and $y - intercept: 4$
63. Find the distance from the point $P(6,-1)$ to the line $6x - 4y + 9 = 0$
64. Find whether the given point $(5,8)$ lies above or below the line $2x - 3y + 6 = 0$

65. Check whether the lines are concurrent or not.
$3x - 4y - 3 = 0; 5x + 12y + 1 = 0 ; 32x + 4y - 17 = 0$
66. Transform the eqution $5x - 12y + 39 = 0$ to "Two-intercept form".
67. Find the point of intersection of the lines $x - 2y + 1 = 0$ and $2x - y + 2 = 0$
68. Find an equation of the line through the point $(2, -9)$ and the intersection of the lines $2x + 5y - 8 = 0$ and $3x - 4y - 6 = 0$.
69. Determine the value of p such that the lines $2x - 3y - 1 = 0, 3x - y - 5 = 0$ and $3x + py + 8 = 0$ meet at a point.
70. Find the angle measured from the line l_1 to the line l_2 where l_1: Joining $(2, 7)$ and $(7, 10)$
l_2: Joining $(1, 1)$ and $(-5, 5)$
71. Express the given system of equations in matrix form $2x + 3y + 4 = 0; x - 2y - 3 = 0; 3x + y - 2 = 0$
72. Find the angle from the line with slope $-\frac{7}{3}$ to the line with slope $\frac{5}{2}$.
73. Find an equation of each of the lines represented by $20x^2 + 17xy - 24y^2 = 0$
74. Define Homogenous equation.
75. Write down the joint equation.

Q.NO.4

1. Find a joint equation of the straight lines through the origin perpendicular to the lines represented by $x^2 + xy - 6y^2 = 0$.
2. Find measure of angle between the lines represented by $x^2 - xy - 6y^2 = 0$.
3. Define "Corner Point" or "Vertex".
4. Graph the solution set of linear inequality $3x + 7y \geq 21$.
5. Indicate the solution set of $3x + 7y \geq 21 ; x - y \leq 2$
6. What is "Corresponding equation".
7. Graph the inequality $x + 2y < 6$.
8. Graph the feasible region of $x + y \leq 5 ; -2x + y \leq 0 \quad x \geq 0; y \geq 0$
9. Graph the feasible region of $5x + 7y \leq 35; x - 2y \leq 4 \quad x \geq 0; y \geq 0$
10. Define "Feasible region".
11. Graph the feasible region of $2x - 3y \leq 6; 2x + y \geq 2 \quad x \geq 0; y \geq 0$
12. $\underline{a} = 3\underline{i} - 2\underline{j} + \underline{k}, \underline{b} = \underline{i} + j$, find $b \times a$
13. A force $\underline{F} = 7\underline{i} + 4\underline{j} - 3\underline{k}$ is applied at $P(1, -2, 3)$. Find its moment about the point $Q(2, 1, 1)$.
14. By means of slope, show the points lie on the same line $A(-1, -3), B(1, 5), C(2, 9)$
15. Calculate the projection of $\underline{a}$ along $\underline{b}$ when $\underline{a} = \underline{i} + \underline{k}, \underline{b} = \underline{j} + \underline{k}$
16. Check the position of the point $(5, 6)$ with respect to the circle $2x^2 + 2y^2 + 12x - 8y + 1 = 0$.
17. Check whether $(-2, 4)$ lies above or below $4x + 5y - 3 = 0$
18. Check whether the point $(-2, 4)$ lies above or below the line $4x + 5y - 3 = 0$.
19. Check whether the point $(-4, 7)$ is above or below of the line $6x - 7y + 70 = 0$.
20. Convert $2x - 4y + 11 = 0$ into slope intercept form.
21. Convert the equation $4x + 7y - 2 = 0$ into two intercept form.
22. Convert the equation into two intercept form $4x + 7y - 2 = 0$.
23. Define direction angles and direction cosines of a vector
24. Define focal chord of parabola.
25. Define parabola.
26. Define trapezium.
27. Define unit vector.
28. Find a scalar " α " so that the vectors $2\underline{i} + \alpha\underline{j} + 5\underline{k}$ and $3\underline{i} + \underline{j} + \alpha\underline{k}$ are perpendicular.
29. Find a vector of length 5 , in the direction of opposite that of $\underline{v} = \underline{i} - 2\underline{j} + 3\underline{k}$.
30. Find a vector perpendicular to each of the vector $\underline{a} = 2\underline{i} - \underline{j} - \underline{k}$ and $\underline{b} = 4\underline{i} + 2\underline{j} - \underline{k}$.

31. Find a vector perpendicular to each of the vectors $= 2\hat{l} + \hat{j} + \hat{k}$ and $= 4\hat{l} + 2\hat{j} -$ k.
32. Find a vector whose magnitude is ' 4 ' and is parallel to $2\underline{i} - 3\underline{j} + 6\underline{k}$.
33. Find an equation of a line bisecting 2^{nd} and 4^{th} quadrants.
34. Find an equation of a line through the points $(-2, 1)$ and $(6, -4)$.
35. Find an equation of a line with x-intercept: -9 and slope: -4.
36. Find an equation of hyperbola if its foci $(0, \pm 9)$ and directrices $y = \pm 4$.
37. Find an equation of the line through $(-4, -5)$ and perpendicular to the line having slope $\frac{-3}{2}$
38. Find the angle from the line with slope $\frac{-7}{3}$ to the line with slope $\frac{5}{2}$
39. Find an equation of the line through $(5, -8)$ and perpendicular to the join of A $(-15, -8), \mathrm{B}(10, -7)$
40. Find an equation of the line with x-intercept: -3 and y-intercept: 4
41. Find an equation of the perpendicular bisector of the segment joining the points A $(3, 5)$ and $B(9, 8)$.
42. Find an equation of the vertical line through $(-5, 3)$.
43. Find an unit vector in the direction of the vector $v = \frac{1}{2}\frac{i}{2} + \frac{\sqrt{3}}{2}\boldsymbol{j}$.
44. Find centre and radius of circle $5x^2 + 5y^2 + 14x + 12y - 10 = 0$.
45. Find centre and vertices of ellipse $\frac{(x-1)^2}{4} + \frac{(y-1)^2}{9} = 1$.
46. Find condition that the lines $y = m_1x + c_1, y = m_2x + c_2, y = m_3x + c_3$ are concurrent.
47. Find direction cosine of $\underline{v} = 3\underline{i} - \underline{j} + 2\underline{k}$.
48. Find eccentricity of the ellipse $x^2 + 4y^2 = 16$.
49. Find equation of hyperbola with foci $(\pm 5, 0)$ and vertex of $(3, 0)$.
50. Find equation of latux rectum of parabola $y^2 = -8(x - 3)$
51. Find focus and vertex of the parabola $y = 6x^2 - 1$
52. Find h such that $A(-1, h), B(3, 2)$ and $C(7, 3)$ are collinear.
53. Find length of tangent segment from $(-5, 4)$ to $5x^2 + 5y^2 - 10x + 15y - 131 = 0$
54. Find measure of the angle between the lines represented by $x^2 - xy - 6y^2 = 0$
55. Find point which divide $A(-6, 3)$ ad $B[(5, -2)$ internally in $2: 3$
56. Find position vector of a point which divide the join of E with position vector $5i$ and F with position vector $4\underline{i} + \underline{j}$ in ratio $2: 5$.
57. Find slope and inclination of the line joining points $(4, 6), (4, 8)$
58. Find the angle between the vectors $\underline{u} = 2\underline{i} - \underline{j} + \underline{k}$ and $\underline{v} = -\underline{i} + \underline{j}$.
59. Find the area of the triangle with vertices $A(1, -1, 1), B(2, 1, -1)$ and $C(-1, 1, 2)$
60. Find the centre and radius of the circle $x^2 + y^2 + 12x - 10y = 0$
61. Find the coordinate of the points of the points of intersection of the line $x + 2y = 6$ with the circle $x^2 + y^2 - 2x - 2y - 39 = 0$.
62. Find the coordinates of the points of intersection of the line $2x + y = 5$ and $x^2 + y^2 + 2x - 9 = 0$.
63. Find the direction cosines for $\overrightarrow{PQ}$, where $P(2, 1, 5), Q(1, 3, 4)$.
64. Find the direction cosines of the vector $\underline{i} - 2\underline{j} + \underline{k}$.
65. Find the distance from the point $P(6, -1)$ to the line $6x - 4y + 9 = 0$. 16
66. Find the equation of ellipse when foci $(\pm 3, 0)$ and minor axis of length 10
67. Find the equation of the line through $A(-6, 5)$ having slope 7.
68. Find the focus and directrix of the parabola $y = 6x^2 - 1$.
69. Find the focus and vertex of parabola $(x - 1)^2 = 8(y + 2)$.
70. Find the lines represented by $20x^2 + 17xy - 24y^2 = 0$.
71. Find the lines represented by $x^2 - xy - 6y^2 = 0$, also find the angle between them.
72. Find the measure of angle between the lines represented by $x^2 - xy - 6y^2 = 0$.
73. Find the mid-point of the line joining the two points $A(-8, 3), B[2, 1)$.
74. Find the point three-fifth of the way along line segment from $A(-5, 8)$ to $B\ (5, 3)$ ·
75. Find the projection of vector $\underline{a}$ along vector $\underline{b}$ and projection of vector $\underline{b}$ along when $\underline{a} = \hat{\imath} - \hat{k}, \underline{b} = \hat{j} + \hat{k}$
76. Find the value of $3\boldsymbol{j}.\underline{k} \times \underline{a}$.
77. Find the value of $2\underline{i} \times 2\underline{j} - \underline{k}$.

78. Find unit vector perpendicular to the plane of $\underline{a}$ and $\underline{b}$ if $\underline{a} = -\underline{i} - \underline{j} - \underline{k}, \underline{b} = 2\underline{i} - 3\underline{j} + 4\underline{k}$.
79. Find vertices and equation of directrices of hyperbola $x^2 - y^2 = 9$. 17Grp11,
80. Find α so that $\underline{u} = \alpha\underline{i} + 2\alpha\underline{j} - \underline{k}$ and $\underline{v} = \underline{i} + \alpha\underline{j} + 3\underline{k}$ are perpendicular.
81. Find a, so that $|a\underline{i} + (a+1)\underline{j} + 2\underline{k}| = 3$.
82. Fine the value $3\underline{j} \cdot \underline{k} \times \underline{i}$.
83. If $\overrightarrow{AB} = \overrightarrow{CD}$, find coordinates of points A, If B, C, D are $(1, 2), (-2, 5), (4, 11)$
84. If $\underline{a} = 2\underline{i} + \underline{j} - \underline{k}$ and $\underline{b} = \underline{i} - \underline{j} + \underline{k}$ find the cross product $\underline{a} \times \underline{b}$
85. If $\underline{u} = 3\underline{i} + \underline{j} - \underline{k}$ and $\underline{v} = 2\underline{i} - \underline{j} + \underline{k}$, find the cosines of the angle θ between $\underline{u}$ and $\underline{v}$
86. If O is the origin and $\overrightarrow{OP} = \overrightarrow{AB}$, find the point P when A and B are $(-3, 7)$ and $(1, 0)$ respectivel
87. Prove that if $\underline{a} + \underline{b} + \underline{c} = 0$ then $\underline{a} \times \underline{b} = \underline{b} \times \underline{c} = \underline{c} \times \underline{a}$
88. Prove that $\underline{a} \times (\underline{b} + \underline{c}) + \underline{b} \times (\underline{c} + \underline{a}) + \underline{c} \times (\underline{a} + \underline{b}) = 0$.
89. Prove that if the lines are perpendicular, then product of their slopes $= -1$
90. Show that the points $A(3, 1), B(-2, -3)$ and $C(2, 2)$ are vertices of an isosceles triangle.
91. Show that the points $A(-1, 2), B(7, 5)$ and $C(2, -6)$ are vertices of a right triangle.
92. Show that the triangle with vertices $A(1, 1), B(4, 5)$ and $C(12, -5)$ is right triangle.
93. Show that vectors $3\underline{i} - 2\underline{j} + \underline{k}, \underline{i} - 3\underline{j} + 5\underline{k}$ and $2\underline{i} + \underline{j} - 4\underline{k}$ from a right triangle.
94. Transform $5x - 12y + 39 = 0$ into two intercept form. 15 Grp II,
95. Two lines l_1 and l_2 with respective slopes m_1 and m_2 are parallel if $m_1 = m_2$.
96. Write and equation of parabola with focus $(-1, 0)$, vertex $(-1, 2)$.
97. Write direction cosine of $\overrightarrow{PQ}$, if $P(2, 1, 5), Q(1, 3, 1)$.
98. Write down the equation of straight line with x-intercept $(2, 0)$ and y-intercept $(0, -4)$
99. Find the mid-point of line segment joining the points $A\left(-\sqrt{5}, -\frac{1}{3}\right)$ and $(-3\sqrt{5}, 5)$.
100. Find the slope and inclination of the line joining the points $(-2, 4)$ and $(5, 11)$.
101. Find equation of tangent to the circle $x^2 + y^2 = 25$ at $(4, 3)$.
102. Find the vertex and directrix of parabola $x^2 = 4(y - 1)$.
103. Find the centre and vertices of the ellipse $9x^2 + y^3 = 18$.
104. Find the sum of vectors $\overrightarrow{AB}$ and $\overrightarrow{CD}$, given the four points $A(1, -1), B(2, 0), C(-1, 3)$ and $D(-2, 2)$.
105. Find a vector perpendicular to each of the vectors $\underline{a} = 2\underline{i} + \underline{j} + \underline{k}$ and $\underline{b} = 4\underline{i} + 2\underline{j} - \underline{k}$.
106. Prove that the vectors $\underline{i} - 2\underline{j} + 3\underline{k} - 2\underline{i} + 3\underline{j} - 4\underline{k}$ and $\underline{i} - 3\underline{j} + 5\underline{k}$ are co-planar.
107. Find equation of a line through (−4 , 7) and parallel to the line $2x - 7y + 4 = 0$.
108. Find equation of a line through (−6 , 5) having slope = 7
109. Find distance from the point P (6 , −1) to the line $6x - 14y + 9 = 0$
110. Find area of triangular region whose vertices are A (5 , 3), B (−2 , 2), C (4 , 2).
111. Find the equation of tangent to the circle $x2 + y3 = 25$ at (4 , 3). 14 Grp I,
112. Find the equation of parabola whose focus is (2 , 5) and directrix is $y = 1$
113. Find foci and eccentricity of ellipse
114. Find vector from A to origin whose $\overrightarrow{AB} = 4i - 2j$ and B (−2 , 5) .
115. Find a vector whose magnitude is 2 and is parallel to $i + j + k$. .
116. Find α so that the vectors $2i + \alpha j + 5k$ and $3i + j + \alpha k$ are perpendicular.
117. 129. Find α so that $\alpha i + j, i + j + 3k, 2i + j - 2k$ are co-planar

Long Questions

1. Chapter No. 1 (Functions and Limits)

1. Evaluate $\lim_{x \to 0} \frac{1 - \cos x}{\sin^2 x}$ 17GrpI,
2. Evaluate $\lim_{x \to 0} \frac{\sin x}{x} = 1$