

Mathematics Question Bank (Inter Part – II)

Short Questions

Section I (Question No. 4)

1. $\underline{a} = 3\underline{i} - 2\underline{j} + \underline{k}$, $\underline{b} = \underline{i} + \underline{j}$, find $b \times a$. 17 Grp II,
2. 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). 19 Grp I,
3. By means of slope, show the points lie on the same line A (-1, -3), B (1, 5), C (2, 9). 17 Grp II,
4. Calculate the projection of \underline{a} along \underline{b} when $\underline{a} = \underline{i} + \underline{k}$, $\underline{b} = \underline{j} + \underline{k}$. 15 Grp I,
5. Check the position of the point (5, 6) with respect to the circle $2x^2 + 2y^2 + 12x - 8y + 1 = 0$. 19 Grp I,
6. Check whether (-2, 4) lies above or below $4x + 5y - 3 = 0$. 15 Grp II,
7. Check whether the point (-2, 4) lies above or below the line $4x + 5y - 3 = 0$. 16 Grp II,
8. Check whether the point (-4, 7) is above or below of the line $6x - 7y + 70 = 0$. 17 Grp II,
9. Convert $2x - 4y + 11 = 0$ into slope intercept form. 18 Grp I, 18 Grp II,
10. Convert the equation $4x + 7y - 2 = 0$ into two intercept form. 17 Grp II,
11. Convert the equation into two intercept form $4x + 7y - 2 = 0$. 17 Grp II, 16 Grp II,
12. Define direction angles and direction cosines of a vector. 18 Grp II,
13. Define focal chord of parabola. 17 Grp II,
14. Define parabola. 19 Grp I,
15. Define trapezium. 19 Grp I,
16. Define unit vector. 18 Grp I,
17. 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. 18 Grp I,

18. Find a vector of length 5, in the direction of opposite that of $\underline{v} = \underline{i} - 2\underline{j} + 3\underline{k}$. 17 Grp II,
19. Find a vector perpendicular to each of the vector $\underline{a} = 2\underline{i} - \underline{j} - \underline{k}$ and $\underline{b} = 4\underline{i} + 2\underline{j} - \underline{k}$. 16 Grp I,
20. Find a vector perpendicular to each of the vectors $= 2\hat{i} + \hat{j} + \hat{k}$ and $= 4\hat{i} + 2\hat{j} - \hat{k}$. 18 Grp II,
21. Find a vector whose magnitude is '4' and is parallel to $2\underline{i} - 3\underline{j} + 6\underline{k}$. 18 Grp I, 16 Grp I,
22. Find an equation of a line bisecting 2nd and 4th quadrants. 18 Grp II,
23. Find an equation of a line through the points $(-2, 1)$ and $(6, -4)$. 18 Grp I,
24. Find an equation of a line with x -intercept: -9 and slope: -4 . 18 Grp II,
25. Find an equation of hyperbola if its foci $(0, \pm 9)$ and directrices $y = \pm 4$. 19 Grp I,
26. Find an equation of the circle with ends of diameter at $(-3, 2)$ and $(5, -6)$. 16 Grp II,
27. Find an equation of the ellipse with centre $(0, 0)$, focus $(0, -3)$, vertex $(0, 4)$. 18 Grp I,
28. Find an equation of the line bisecting the first and third quadrants. 18 Grp I,
29. Find an equation of the line through $(-4, -6)$ and perpendicular to the line having slope $\frac{-3}{2}$. 19 Grp I, 15 Grp II,
30. Find the angle from the line with slope $\frac{-7}{3}$ to the line with slope $\frac{5}{2}$. 14 Grp II,
31. Find an equation of the line through $(5, -8)$ and perpendicular to the join of A $(-15, -8)$, B $(10, -7)$. 15 Grp I,
32. Find an equation of the line with x -intercept: -3 and y -intercept: 4 . 18 Grp I,
33. Find an equation of the perpendicular bisector of the segment joining the points A $(3, 5)$ and B $(9, 8)$. 17 Grp II,

34. Find an equation of the vertical line through $(-5, 3)$. 17 Grp II, 16 Grp I, 16 Grp II,
35. Find an unit vector in the direction of the vector $\underline{v} = \frac{1}{2}\underline{i} + \frac{\sqrt{3}}{2}\underline{j}$. 18 Grp I,
36. Find an equation of a circle of radius "a" and lying in the second quadrant such that it is tangent to both the axes. 15 Grp I,
37. Find an equation of an ellipse with foci $(\pm 3, 0)$ and minor axis of length 10. 18 Grp II,
38. Find centre and radius of circle $5x^2 + 5y^2 + 14x + 12y - 10 = 0$. 15 Grp II,
39. Find centre and vertices of ellipse $\frac{(x-1)^2}{4} + \frac{(y-1)^2}{9} = 1$. 17 Grp II,
40. Find condition that the lines $y = m_1x + c_1, y = m_2x + c_2, y = m_3x + c_3$ are concurrent. 15 Grp II,
41. Find coordinates of the point that divide the join of A $(-6, 3)$ and B $(5, -2)$ in the ratio of 2 : 3 internally. 19 Grp I,
42. Find direction cosine of $\underline{v} = 3\underline{i} - \underline{j} + 2\underline{k}$. 15 Grp II,
43. Find eccentricity of the ellipse $x^2 + 4y^2 = 16$. 19 I,
44. Find equation of hyperbola with foci $(\pm 5, 0)$ and vertex of $(3, 0)$. 15 Grp I,
45. Find equation of latus rectum of parabola $y^2 = -8(x - 3)$. 18 Grp II,
46. Find the focus and vertex of parabola $y^2 = -8(x - 3)$. 15 Grp I,
47. Find the focus and vertex of the parabola $y^2 = 8x$. 16 Grp I,
48. Find equation of parabola with focus $(1, 2)$, vertex $(3, 2)$. 15 Grp II,
49. Find foci, eccentricity of hyperbola $\frac{y^2}{4} - x^2 = 1$. 15 Grp II,
50. Find focus and vertex of the parabola $y = 6x^2 - 1$. 18 Grp II,
51. Find h such that A $(-1, h)$, B $(3, 2)$ and C $(7, 3)$ are collinear. 17 Grp II, 16 Grp I,
52. Find length of tangent segment from $(-5, 4)$ to $5x^2 + 5y^2 - 10x + 15y - 131 = 0$. 15 Grp II,

53. Find measure of the angle between the lines represented by $x^2 - xy - 6y^2 = 0$.
16 Grp I,
54. Find point which divide A $(-6, 3)$ and B $(5, -2)$ internally in $2 : 3$. 15 Grp II,
55. Find position vector of a point which divide the join of E with position vector $5\mathbf{i}$ and F with position vector $4\mathbf{i} + \mathbf{j}$ in ratio $2 : 5$. 15 Grp II,
56. Find slope and inclination of the line joining points $(4, 6), (4, 8)$. 16 Grp I,
57. Find the angle between the vectors $\underline{u} = 2\underline{i} - \underline{j} + \underline{k}$ and $\underline{v} = -\underline{i} + \underline{j}$. 15 Grp I,
58. Find the area of the triangle with vertices A $(1, -1, 1)$, B $(2, 1, -1)$ and C $(-1, 1, 2)$. 15 Grp I,
59. Find the centre and radius of the circle $x^2 + y^2 + 12x - 10y = 0$. 16 Grp I, 16 Grp II,
60. Find the coordinate of the points of the points of intersection of the line $x + 2y = 6$ with the circle $x^2 + y^2 - 2x - 2y - 39 = 0$. 16 Grp I,
61. Find the coordinates of the points of intersection of the line $2x + y = 5$ and $x^2 + y^2 + 2x - 9 = 0$. 15 Grp I,
62. Find the direction cosines for \overrightarrow{PQ} , where P $(2, 1, 5)$, Q $(1, 3, 1)$. 15 Grp I,
63. Find the direction cosines of the vector $6\underline{i} - 2\underline{j} + \underline{k}$. 16 Grp II,
64. Find the distance from the point P $(6, -1)$ to the line $6x - 4y + 9 = 0$. 16 Grp I,
65. Find the eccentricity and directrices of the ellipse whose equation is $26x^2 + 9y^2 - 225 = 0$. 18 Grp I,
66. Find the equation of ellipse when foci $(\pm 3, 0)$ and minor axis of length 10. 17 Grp II,
67. Find the equation of the line through A $(-6, 5)$ having slope 7. 16 Grp II,
68. Find the foci and length of the latus rectum of the ellipse $9x^2 + y^2 = 18$. 18 Grp II,
69. Find the focus and directrix of the parabola $y^2 = -12x$. 17 Grp II,

70. Find the focus and directrix of the parabola $y = 6x^2 - 1$. 18 Grp I,
71. Find the focus and vertex of parabola $(x - 1)^2 = 8(y + 2)$. 16 Grp II,
72. Find the lines represented by $20x^2 + 17xy - 24y^2 = 0$. 16 Grp II,
73. Find the lines represented by $x^2 - xy - 6y^2 = 0$, also find the angle between them. 15 Grp I,
74. Find the measure of angle between the lines represented by $x^2 - xy - 6y^2 = 0$. 18 Grp II,
75. Find the mid-point of the line joining the two points A $(-8, 3)$, B $(2, 1)$. 17 Grp II,
76. Find the point P on the join of A $(1, 4)$ and B $(5, 6)$ that is twice as far from A as B is from A and lies on the same side of A as B does. 15 Grp I,
77. Find the point three-fifth of the way along line segment from A $(-5, 8)$ to B $(5, 3)$. 16 Grp I,
78. Find the projection of vector \underline{a} along vector \underline{b} and projection of vector \underline{b} along \underline{a} when $\underline{a} = \hat{i} - \hat{k}$, $\underline{b} = \hat{j} + \hat{k}$. 18 Grp II,
79. Find the value of $3\underline{j} \cdot \underline{k} \times \underline{a}$. 17 Grp II,
80. Find the value of $2\underline{i} \times 2\underline{j} \cdot \underline{k}$. 16 Grp II,
81. Find the vector from the point A to the origin where $\underline{AB} = 4\underline{i} - 2\underline{j}$ and B is the point $(-2, 5)$. 17 Grp II,
82. Find the vertices and directrices of the ellipse $25x^2 + y^2 = 225$. 16 Grp II,
83. Find unit vector perpendicular to the plane of \underline{a} and \underline{b} if $\underline{a} = -\underline{i} - \underline{j} - \underline{k}$, $\underline{b} = 2\underline{i} - 3\underline{j} + 4\underline{k}$. 19 Grp I,
84. Find vertices and equation of directrices of hyperbola $x^2 - y^2 = 9$. 17 Grp II,
85. 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. 15 Grp II,
86. Find α , so that $|\alpha\underline{i} + (\alpha + 1)\underline{j} + 2\underline{k}| = 3$. 17 Grp II,

87. Find the value $3\mathbf{j} \cdot \mathbf{k} \times \mathbf{i}$. 16 Grp I,
88. If $\overrightarrow{AB} = \overrightarrow{CD}$, find coordinates of points A. If B, C, D are $(1, 2)$, $(-2, 5)$, $(4, 11)$.
19 Grp I,
89. If $\mathbf{a} = 2\mathbf{i} + \mathbf{j} - \mathbf{k}$ and $\mathbf{b} = \mathbf{i} - \mathbf{j} + \mathbf{k}$ find the cross product $\mathbf{a} \times \mathbf{b}$. 16 Grp II,
90. If $\mathbf{u} = 3\mathbf{i} + \mathbf{j} - \mathbf{k}$ and $\mathbf{v} = 2\mathbf{i} - \mathbf{j} + \mathbf{k}$, find the cosines of the angle θ between \mathbf{u} and \mathbf{v} . 16 Grp II,
91. If length of perpendicular from origin to a line is 5 units and its inclination is 120° , find the slope of y-intercept of the line? 15 Grp I,
92. If O is the origin and $\overrightarrow{OP} = \overrightarrow{AB}$, find the point P when A and B are $(-3, 7)$ and $(1, 0)$ respectively. 16 Grp I,
93. Prove that if $\mathbf{a} + \mathbf{b} + \mathbf{c} = 0$ then $\mathbf{a} \times \mathbf{b} = \mathbf{b} \times \mathbf{c} = \mathbf{c} \times \mathbf{a}$. 15 Grp II,
94. Prove that $\mathbf{a} \times (\mathbf{b} + \mathbf{c}) + \mathbf{b} \times (\mathbf{c} + \mathbf{a}) + \mathbf{c} \times (\mathbf{a} + \mathbf{b}) = 0$. 14 Grp II,
95. Prove that if the lines are perpendicular, then product of their slopes = -1 . 18 Grp II,
96. Show that the points A $(3, 1)$, B $(-2, -3)$ and C $(2, 2)$ are vertices of an isosceles triangle. 18 Grp I,
97. Show that the points A $(-1, 2)$, B $(7, 5)$ and C $(2, -6)$ are vertices of a right triangle. 17 Grp II,
98. Show that the triangle with vertices A $(1, 1)$, B $(4, 5)$ and C $(12, -5)$ is right triangle. 19 Grp I,
99. Show that vectors $3\mathbf{i} - 2\mathbf{j} + \mathbf{k}$, $\mathbf{i} - 3\mathbf{j} + 5\mathbf{k}$ and $2\mathbf{i} + \mathbf{j} - 4\mathbf{k}$ form a right triangle. 19 Grp I,
100. The points A $(-5, -2)$ and B $(5, -4)$ are ends of a diameter of a circle, find the centre and radius of the circle. 17 Grp II,
101. Transform $5x - 12y + 39 = 0$ into two intercept form. 15 Grp II,

102. Two lines l_1 and l_2 with respective slopes m_1 and m_2 are parallel if $m_1 = m_2$. 15 Grp I,
103. Write an equation of parabola with focus $(-1, 0)$, vertex $(-1, 2)$. 18 Grp I,
104. Write direction cosine of \overrightarrow{PQ} , if P $(2, 1, 5)$, Q $(1, 3, 1)$. 19 Grp I,
105. Write down the equation of straight line with x -intercept $(2, 0)$ and y -intercept $(0, -4)$. 18 II,
106. Write the standard equation of hyperbola. 17 Grp II,
107. Find the mid-point of line segment joining the points A $(-\sqrt{5}, -\frac{1}{3})$ and $(-3\sqrt{5}, 5)$. 14 Grp II,
108. Find the slope and inclination of the line joining the points $(-2, 4)$ and $(5, 11)$. 14 Grp II,
109. Find an equation of horizontal line through $(7, -9)$. 14 Grp II,
110. Find an equation of each of the lines represented by $10x^2 - 23xy - 5y^2 = 0$. 14 Grp II,
111. The points A $(-5, -2)$ and B $(5, -4)$ are ends of diameter of a circle. Find the centre and radius. 14 Grp II,
112. Find equation of tangent to the circle $x^2 + y^2 = 25$ at $(4, 3)$.
113. Find the vertex and directrix of parabola $x^2 = 4(y - 1)$. 14 Grp II,
114. Find the centre and vertices of the ellipse $9x^2 + y^3 = 18$. 14 Grp II,
115. 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 $(-2, 2)$. 14 Grp II,
116. Find a vector perpendicular to each of the vectors $\underline{a} = 2\underline{i} + \underline{j} + \underline{k}$ and $\underline{b} = 4\underline{i} + 2\underline{j} - \underline{k}$. 14 Grp II,
117. 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. 14 Grp II,

118. Find equation of a line through $(-4, 7)$ and parallel to the line $2x - 7y + 4 = 0$.

14 Grp I,

119. Find equation of a line through $(-6, 5)$ having slope = 7. 14 Grp I,

120. Find distance from the point P $(6, -1)$ to the line $6x - 14y + 9 = 0$. 14 Grp I,

121. Find area of triangular region whose vertices are A $(5, 3)$, B $(-2, 2)$, C $(4, 2)$. 14

Grp I,

122. Find the equation of tangent to the circle $x^2 + y^2 = 25$ at $(4, 3)$. 14 Grp I,

123. Find the equation of parabola whose focus is $(2, 5)$ and directrix is $y = 1$. 14 Grp

I,

124. Find foci and eccentricity of ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$. 14 Grp I,

125. Find eccentricity and foci of the asymptotes of hyperbola $\frac{y^2}{16} - \frac{x^2}{49} = 1$. 14 Grp I,

126. Find vector from A to origin whose $\overline{AB} = 4\underline{i} - 2\underline{j}$ and B $(-2, 5)$. 14 Grp I,

127. Find a vector whose magnitude is 2 and is parallel to $\underline{i} + \underline{j} + \underline{k}$. 14 Grp I,

128. Find 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. 14

Grp I,

129. Find α so that $\alpha\underline{i} + \underline{j}, \underline{i} + \underline{j} + 3\underline{k}, 2\underline{i} + \underline{j} - 2\underline{k}$ are co-planar. 14 Grp I,