EXADEMY

ONLINE NATIONAL TEST

Course: UPSC – CSE - Mathematics Optional

Subject: Analytical Geometry **Time: 2 hours**

Total Questions: 15 **Total Marks: 100**

Q1. Transform the cartesian coordinates (1, 2, 3) of a point into spherical polar coordinates.

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Q2. Find the locus of a point which moves so that the sum of its distances from the points (a, 0, 0) and (-a, 0, 0) is constant.

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Q3. Prove that the four points whose co-ordinates are (5, -1, 1), (7, -4, 7), (1, -6, 10), (-1, -3, 4) are vertices of a rhombus.

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Q4. Find the distance of the point (1, 2, 0) from the point where the line joining (2, -3, 1) and (3, -4, -5) cuts the plane $2x + y + z = 7$.

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Q5. A plane makes intercepts -6, 3, 4 upon the co-ordinate axes. What is the length of perpendicular from the origin on it?

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Q6. Find the angle between the planes $3x – 4y + 5z = 0$ and $2x – y – 2z = 5$.

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Q7. Find the direction cosine of any normal to the plane passing through the points (0, -1, -1), (4, 5, 1), (3, 9, 4), (-4, 4, 4).

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Q8. The plane x – 2y + 3z = 0 is rotated through a right angle about its line of intersection with the plane 2x + 3y – 4z – 5 = 0. Find the equation of the plane in its new position.

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Q9. Find the equation of the plane through the intersection of the planes x + y + z = 1 and 2x + 3y – z + 4 = 0 which is parallel to (a) the x-axis, (b) the y-axis.

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Q10. Find the equation of the plane through (α, β, γ) and perpendicular to the line joining this point to the origin.

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Q11. Find the equation of the plane through (4, -1, 2) and perpendicular to the line joining (1, -5, 10) and (2, 3, 4). Also find the angles which it makes with the co-ordinate planes.

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Q12. Show that the plane 14x – 8y + 13 = 0 bisects the obtuse angle between angles 3x + 4y – 5z + 1 = 0 and 5x + 12y – 13z = 0.

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Q13*. Show that $\frac{a}{y-z} + \frac{b}{z-x} + \frac{c}{x-y} = 0$ represents a pair of planes. Find the angle between them also.

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Q14. Find the area of the triangle whose vertices are A(1, 2, 3), B(2, -1, 1) and C(1, 2, -4).

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Q15. A point P moves on the plane x/a + y/b + z/c = which is fixed and the plane through P perpendicular to OP meets the axes in A, B, C. If the planes through A, B, C parallel to the co-ordinates planes meet in a point Q, show that the locus of Q is

$$\frac{1}{x^2}+\frac{1}{y^2}+\frac{1}{z^2}=\frac{1}{ax}+\frac{1}{by}+\frac{1}{cz}$$

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