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Total No. of Pages : 02

Total No. of Questions : 07

B.Sc. (CS) (2013 & Onwards) (Sem.-2)

COORDINATE GEOMETRY

Subject Code : BCS-202

M.Code : 71507

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.

SECTION-A**1. Answer briefly :**

- a) Define an ellipse and a parabola.
- b) Find the equation of the ellipse having major axis along x-axis and minor axis along y-axis, eccentricity $\frac{1}{2}$, and the distance between the foci as 4.
- c) Find the equation to the two straight lines through the origin perpendicular to the lines $5x^2 - 7xy - 3y^2 = 0$.
- d) Find the points of the parabola $y^2 = 8x$, whose ordinate is twice the abscissa.
- e) State and prove the reciprocal property of pole and polar with respect to a parabola.
- f) Find the equation to the circle which passes through the points (1, 0), (0, -6) and (3, 4).
- g) Find the equation of normal to a parabola in the slope form.
- h) Find the equation of the hyperbola whose asymptotes are the lines $x + 2y + 1 = 0$ and $2x + y + 3 = 0$ and which passes through the point (1, 2)
- i) Find the transformed equation of $17x^2 - 16xy + 17y^2 - 225 = 0$ when the axes are rotated through an angle of 45° .
- j) Find the equations of the straight lines bisecting the angles between the pair of straight lines $4x^2 - 16xy + 7y^2 = 0$

SECTION-B

2. a) On shifting the origin to the point $(1, -1)$ the axes remaining parallel to the original axis, the equation of a curve becomes $4x^2 + y^2 + 3x - 4y + 2 = 0$. Find its original equation.
- b) Find the value of λ for which the equation $12x^2 - 10xy + 2y^2 + 11x - 5y + \lambda = 0$ represents a pair of straight lines. Also find the angle between them.
3. a) Find the equation of tangent to the circle $x^2 + y^2 = a^2$ which is parallel to the straight line $y = mx + c$.
- b) Define polar of a point. Find the polar of the point $(1, 2)$ with respect to the circle $x^2 + y^2 = 7$.
4. a) Define orthogonal circles. Prove that the pair of circles $x^2 + y^2 - 2ax + c = 0$ $x^2 + y^2 + 2by - c = 0$ intersect orthogonally.
- b) Show that the lines joining the origin to the points of intersection of $x^2 + y^2 + 2gx + c = 0$ and $x^2 + y^2 + 2fy - c = 0$ are at right angles if $g^2 - f^2 = 2c$.
5. a) Find the equation of chord of the parabola $y^2 = 4ax$ in terms of its middle point (x_1, y_1) .
- b) Define a parabola. If chords of the parabola $y^2 = 4ax$ are drawn at fixed distance 'a' from the focus, show that the locus of their poles w.r.t. the parabola is $y^2 = 4x(2a + x)$.
6. a) Show that the line $x + 2y - 4 = 0$ touches the ellipse $3x^2 + 4y^2 = 12$. Also find the point of contact.
- b) Prove that the locus of the middle points of normal chords of the rectangular hyperbola $x^2 - y^2 = a^2$ is $(y^2 - x^2)^3 = 4a^2x^2y^2$.
7. a) Define a conjugate hyperbola. Prove that if a pair of diameters be conjugate w.r.t. a hyperbola then they will also be conjugate w.r.t. the conjugate hyperbola.
- b) Find the eccentricity, the foci and directrices of the ellipse

$$3x^2 + 4y^2 - 12x - 8y + 4 = 0.$$

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.