Roll No. | | | | | | | | | | | | | **Total No. of Pages :02**

Total No. of Questions : 07

B.Sc. (CS) (Sem.–2)

COORDINATE GEOMETRY

Subject Code :BCS-202

M.Code :71507

Date of Examination : 06-07-22

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. Solve the following :

a) Prove that the equation $x^2 - 4xy + 4y^2 - 32x + 4y + 16 = 0$ represents a parabola.

b) Find the eccentricity and directrix of $r(1 - 2\sin\theta) = 2$.

c) Find m for which $y = mx$ and $y = 2mx$ are a pair of conjugate diameters w.r.t. $\frac{x^2}{4} + \frac{y^2}{18} = 1$.

d) Find the equation of the tangents to ellipse $x^2 + 3y^2 = 3$ which are parallel to $y = 4x + 8$.

e) For what value of k will the equation, $kx^2 - 10xy + 12y^2 + 5x - 16y - 3 = 0$ represent a pair of straight line. Also find equation of line.

f) What are the foci of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$.

g) Find the equation of chord of contact of tangents drawn to the ellipse from $\frac{x^2}{4} + \frac{y^2}{6} = 1$ from the point (2, 6).

h) Find the equation of tangents drawn from the point (–2,–1) to the hyperbola $2x^2 - 3y^2 = 6$.

i) Find the eccentricity of the hyperbola $16x^2 - 9y^2 - 32x + 36y - 164 = 0$.

j) Find the equation of normal to the parabola $y^2 = 12x$ which is perpendicular to the line $-3y + 6 = 0$.

SECTION-B

2. a) Find the angle between the pair of straight lines represented by

$x^2 + xy - 6y^2 + 7x + 31y - 18 = 0$.

Also find the equation of the pair of straight lines parallel to these and passing through the point (1,2).

b) Show that the lines joining 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 $g^2 - f^2 = 2c$.

3. a) Find the equation of the circle whose diameter is common chord of the circles $x^2 + y^2 + 2x + 3y + 1 = 0$ and $x^2 + y^2 + 4x + 3y + 2 = 0$

b) Find the radical axis of the circles

$x^2 + y^2 + 4x - 3 = 0$ and $x^2 + y^2 + 6x - 8y + 7 = 0$.

Find the equation of a circle coaxial with these two circles and passing through the point (1,1).

4. a) Transform the equation $x^2 - 2xy + y^2 + x + y = 0$toan equation in which xy term is absent.

b) Show that if $ax^2 + 2hxy + by^2 = 1$ and $a'x^2 + 2h'xy + b'y^2 = 1$ represent the same conic and the axes are rectangular, then $((a - b)^2 + 4h^2 = (a' - b')^2 + 4h'^2$.

5. a) Find joint equation of asymptotes of the hyperbola $3x^2 - 5xy - 2y^2 + 5x + 11y - 16 = 0$. Also find equation of the conjugate hyperbola to given hyperbola.

b) Prove that the locus of the poles of normal chords of the rectangular hyperbola $xy = c^2$ is the curve $(x^2 - y^2)^2 + 4c^2xy = 0$.

6. a) Prove that the tangent and normal at any point of an ellipse bisect respectively the external and internal angles between the focal distances of the point.

b) Obtain equations of two conjugate diameters of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ which are equal in length.

7. a) Prove that the locus of the foot of the perpendicular from the focus on any tangent to a parabola is the tangent at the vertex.

b) Find the equation of the normal to conic $\frac{l}{r} = 1 = e\cos\theta$ at an extremity of its latus rectum.

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.