RNO 17 (2)

(i) Printed Pages: 2 Roll No. .....

(ii) Questions : 8 Sub. Code : 0043

Exam. Code : 0001

B.A./B.Sc. (General) 1st Semester

(1129)

MATHEMATICS

Paper—I

(Plane Geometry)

Time Allowed : Three Hours] [Maximum Marks : 30

Note :— Attempt ***five*** questions in all, selecting at least ***two*** questions from each Section.

SECTION—I

1. (a) If axis be turned through an angle $\tan^{-1}2$, what does the equation
$11x^2 - 4xy + 14y^2 = 5$ become ? 3

(b) By a suitable transformation remove terms involving x, y from the equation $y^2 - 2xy + 2x^2 + 2x - 2y = 0$. 3

2. (a) Prove that the equation :
$6x^2 + 5xy - 4y^2 + 7x + 13y - 3 = 0$
represents a pair of straight lines. Find the point of intersection and the angle between them. 3

(b) Find the bisectors of the angles between the lines joining the origin to the points of intersection of the straight line $x - y = 2$ with the curve :
$5x^2 + 11xy - 8y^2 + 8x - 4y + 12 = 0$. 3

3. (a) Find the equation of the circle which passes through the points (4, 1), (6, 5) and has its centre on the line $4x + y = 16$. 3

(b) Two circles, each of radius 5 units, touch each other at the (1, 2). If the equation of their common tangent is $4x + 3y = 10$, find the equations of the circles. 3

4. (a) Find the locus of middle points of the chords of the circle $x^2 + y^2 + 6x + 2y - 10 = 0$ which subtend a right angle at the centre of the circle. 3

(b) Find equation of the circle which belongs to the co-axial system of which the limiting points are $(1, -1)$ and $(2, 0)$ and which passes through origin. 3

SECTION—II

5. (a) Find the locus of intersection of normals to a parabola inclined at complementary angles to the axis. 3

(b) Prove that the locus of the poles of chords which are normal to parabola $y^2 = 4ax$ is the curve $y^2(x + 2a) + 4a^3 = 0$. 3

6. (a) If the normal at a point P of the parabola $y^2 = 8x$ meets its axis at G, show that the locus of the middle point of PG is a parabola, also find the coordinates of its vertex. 3

(b) Prove that the locus of a point whose polar w.r.t. the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ touches the parabola $y^2 = 4kx$ is another parabola. 3

7. (a) Prove that the product of the focal distances of an extremity of a semi diameter of an ellipse is equal to the square of conjugate semi-diameter. 3

(b) Prove that if a diameter meets a hyperbola, then it does not meet the conjugate hyperbola. 3

8. (a) Show that the poles of all normal chords of the rectangular hyperbola $xy = c^2$ lie on the curve $(x^2 - y^2)^2 + 4xyc^2 = 0$. 3

(b) Show that the equation :

$$3x^2 + 8xy - 3y^2 - 40x - 20y + 50 = 0$$

represents a hyperbola. 3