

(a) Find the orbits of

- (i) S_1 ;
- (ii) S_2 ;
- (iii) M_1 ;
- (iv) M_2 .

[5]

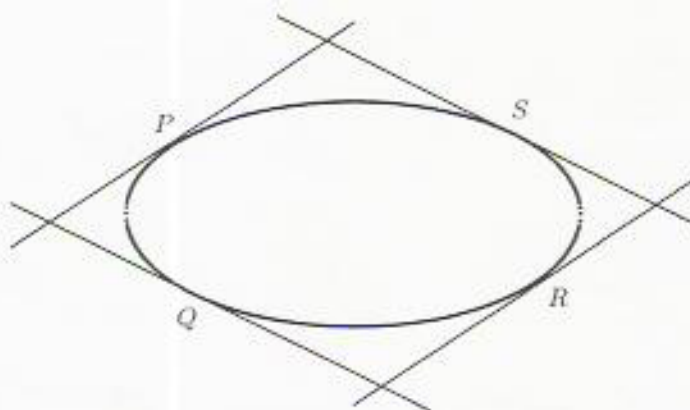
(b) Find the stabilizers of

- (i) S_1 ;
- (ii) S_2 ;
- (iii) M_1 ;
- (iv) M_2 .

[5]

Question 7 – 10 marks

Show that if a parallelogram is drawn so that each of its sides touches an ellipse then the points of contact will themselves form a parallelogram, that is, the quadrilateral $PQRS$ below is a parallelogram. [Hint: show that the result holds for a circle by finding the angles of the quadrilateral $PQRS$.]



[10]

Question 8 – 10 marks

Determine a matrix for the projective transformation t that maps the Points $[2, -1, 1]$, $[1, 2, 4]$, $[3, 3, 2]$, $[4, 0, -1]$ to the Points $[1, 1, 0]$, $[1, 3, 1]$, $[1, -1, 2]$, $[2, -2, 1]$ respectively.

[10]