

**Prabhu Jagatbandhu College**  
**Department of Mathematics**  
**Assignment-3**

1. Discuss the nature of the conics and find centre, equation of latus rectum, focus(if possible)  $4x^2 - 4xy + y^2 - 8x - 6y + 5 = 0$  ,  $x^2 + 4xy + 4y^2 + 4x + y - 15 = 0$
2. Show that the locus of the point of intersection of tangents to the parabola  $y^2 = 4ax$  at points whose ordinates are in the ratio  $p^2 : q^2$  is  $y^2 = \left( \frac{p^2}{q^2} + \frac{q^2}{p^2} + 2 \right) ax$ .
3. Find the area the triangle formed by the tangents from the point  $(h, k)$  to the parabola  $y^2 = 4ax$  and the chord of contact.
4. If the polynomial  $x^n - qx^{n-m} + r$  has a factor of the form  $(x - \alpha)^2$  show that 
$$\left[ \frac{q}{n}(n-m) \right]^n = \left[ \frac{r}{m}(n-m) \right]^m$$
5. Use Sturm's function to show that the roots of the equation are real and distinct  $x^3 + 3x^2 - 9x - 3 = 0$
6. Let  $f : A \rightarrow B$  be a mapping. A relation  $\rho$  is defined on A by " $x\rho y$  iff  $f(x)=f(y)$ ,  $x, y \in A$ ". Show that  $\rho$  is an equivalence relation on A.
7. Let H be a subgroup of a group G. Show that for any  $g \in G$  ,  $K = gHg^{-1} = \{ghg^{-1} : h \in H\}$  is a subgroup of G and  $|K|=|H|$ .
8. If b be an elements of a group and  $o(b)=20$ , find the order of the element  $b^6$  ,  $b^8$   $b^{15}$  .

Deadline of submission: 19/09/16