(6) $The\ equation\ of\ any\ circle\ passing\ through\ the\ intersection\ of\ the\ circle$

$x^2 + y^2 + 2gx + 2fy + c = 0\ and\ the\ line\ ax + by + c = 0\ is$

$$x^2 + y^2 + 2gx + 2fy + c + k(ax + by + c) = 0\ \ [where\ k = constant].$$

(7) $The\ position\ of\ a\ point\ P(x_1, y_1)\ w.r.t.the\ circle\ x^2 + y^2 + 2gx + 2fy + c = 0$

$If\ {x_1}^2 + {y_1}^2 + 2gx_1 + 2fy_1 + c > 0$, $then\ outside\ the\ circle$

$= 0$, $then\ on\ the\ circle$

< 0, $then\ inside\ the\ circle$

(8) (i) $The\ equation\ of\ tangent\ to\ the\ circle\ x^2 + y^2 = a^2\ at\ P(x_1, y_1)\ is$

$xx_1 + yy_1 = a^2$ & $its\ length\ is$

$\sqrt{{x_1}^2 + {y_1}^2 - a^2}.$

(ii) $The\ equation\ of\ tangent\ to\ the\ circle\ x^2 + y^2 + 2gx + 2fy + c = 0\ at\ P(x_1, y_1)\ is$

$xx_1 + yy_1 + g(x + x_1) + f(y + y_1) + c = 0$ & $its\ length\ is$

$\sqrt{{x_1}^2 + {y_1}^2 + 2gx_1 + 2fy_1 + c}.$

(9) (i) $The\ equation\ of\ normal\ to\ the\ circle\ x^2 + y^2 = a^2\ at\ P(x_1, y_1)\ is$

$xy_1 - x_1y = 0.$

(ii) $The\ equation\ of\ normal\ to\ the\ circle\ x^2 + y^2 + 2gx + 2fy + c = 0\ at\ P(x_1, y_1)\ is$

$(x_1 + g)(y - y_1) = (y_1 + f)(x - x_1).$

(10) (i) $If\ the\ circle\ (x - \alpha)^2 + (y - \beta)^2 = a^2\ touches\ X - axis, then\ its\ equation\ will\ be$

$(x - \alpha)^2 + (y - a)^2 = a^2.$

(ii) $If\ the\ circle\ (x - \alpha)^2 + (y - \beta)^2 = a^2\ touches\ Y - axis, then\ its\ equation\ will\ be$

$(x - a)^2 + (y - \beta)^2 = a^2.$

(iii) $If\ the\ circle\ (x - \alpha)^2 + (y - \beta)^2 = a^2\ touches\ both\ the\ axes, then\ its\ eqn\ will\ be$

$(x - a)^2 + (y - a)^2 = a^2.$

(11) $Two\ circles\ will\ touch\ each\ other\ externally\ if$

$the\ distance\ between\ their\ centres = r_1 + r_2.$

(12) $Two\ circles\ will\ touch\ each\ other\ internally\ if$

$the\ distance\ between\ their\ centres = r_1 - r_2.$

Parabola

$a = distance\ between\ vertex\ to\ focus$ & $a > 0$

Equation	**Vertex**	**Axis**	**Focus**	**Length of Latus Rectum**	**Equation of Directrix**	**Vertices of Latus Rectum**
$y^2 = 4ax$	(0,0)	$+ve\ X - axis$	$(a, 0)$	$4a$	$x + a = 0$	$(a, \pm 2a)$
$y^2 = -4ax$	(0,0)	$-ve\ X - axis$	$(-a, 0)$	$4a$	$x - a = 0$	$(-a, \pm 2a)$