1. The circle S_1 with centre $C_1(a_1, b_1)$ and radius r_1 touches externally the circle S_2 with centre $C_2(a_2, b_2)$ and radius r_2. If the tangent at their common point passes through the origin then

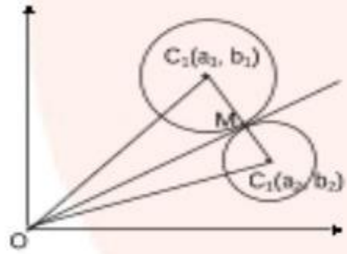
(A) $(a_1^2 + a_2^2) + (b_1^2 + b_2^2) = (r_1^2 + r_2^2)$

(B) $(a_1^2 - a_2^2) + (b_1^2 - b_2^2) = (r_1^2 - r_2^2)$

(C) $(a_1^2 - b_1^2) + (a_2^2 - b_2^2) = r_1^2 + r_2^2$

(D) $(a_1^2 - b_1^2) + (a_2^2 - b_2^2) = (r_1^2 - r_2^2)$

Ans: (B)



From fig: we see that

$OC_1 = a_1^2 + b_1^2$ (i)

$OC_2 = a_2^2 + b_2^2$ (ii)

Also

$(OM)^2 = (OC_1)^2 - (C_1M)^2 = (OC_2)^2 - (C_2M)^2$

$\Rightarrow a_1^2 + b_1^2 - r_1^2 = a_2^2 + b_2^2 - r_2^2$

$\Rightarrow (a_1^2 + b_1^2) - (a_2^2 + b_2^2) = r_1^2 - r_2^2$

$\Rightarrow (a_1^2 - a_2^2) + (b_1^2 - b_2^2) = (r_1^2 - r_2^2)$