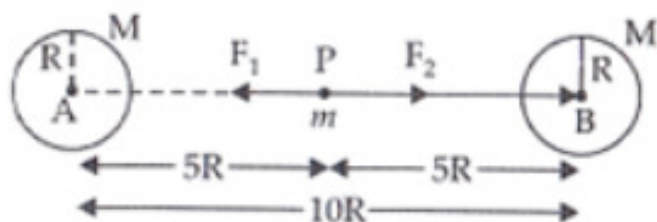


### QUES 05:-

Two identical heavy spheres are separated by a distance 10 times their radius. Will an object placed at the mid point of the line joining their centres be in stable equilibrium or unstable equilibrium? Give reason for your answer.

**Sol.**  $m_1 = m_2 = M$ ,  $r = R$

Let mass  $m$  is placed at the mid point  $P$  of line joining the centres of  $A$  and  $B$  sphere



$$|F_2| = |F_1| = \frac{GMm}{(5R)^2}$$

$$|F_1| = |F_2| = \frac{GMm}{25R^2}$$

The net force  $F_1 + F_2 = 0$ , ( $F_1 = -F_2$ ).  $m$  will be in equilibrium.

If now  $m$  is displaced by  $x$  slightly from  $P$  to  $A$  then  $PA = (5R - x)$  and  $PB = (5R + x)$

$$F_1 = \frac{GMm}{(5R-x)^2} \text{ and } F_2 = \frac{GMm}{(5R+x)^2}$$

$$\therefore F_2 < F_1$$

Hence the resultant force acting on  $P$  is towards  $A$ , resulting in an unstable equilibrium.