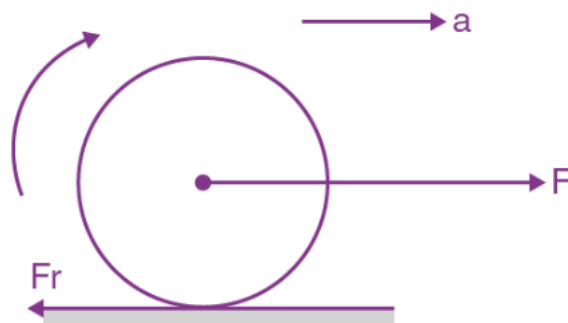Question 10) A homogeneous solid cylindrical roller of radius R and mass M is pulled on a cricket pitch by a horizontal force. Assuming rolling without slipping, angular acceleration of the cylinder is:

(A) 3F/2mR

(B) F/3mR

(C) F/2mR

(D) 2F/3mR

Solution:

F- f_r = ma ---(1)

f_rR = Iα = (mR²/2)α --(2)

For pure rolling

a = αR ---(3)

From (1), (2) and (3)

F – (mRα/2) = mαR

⇒ α = 2F/3mR