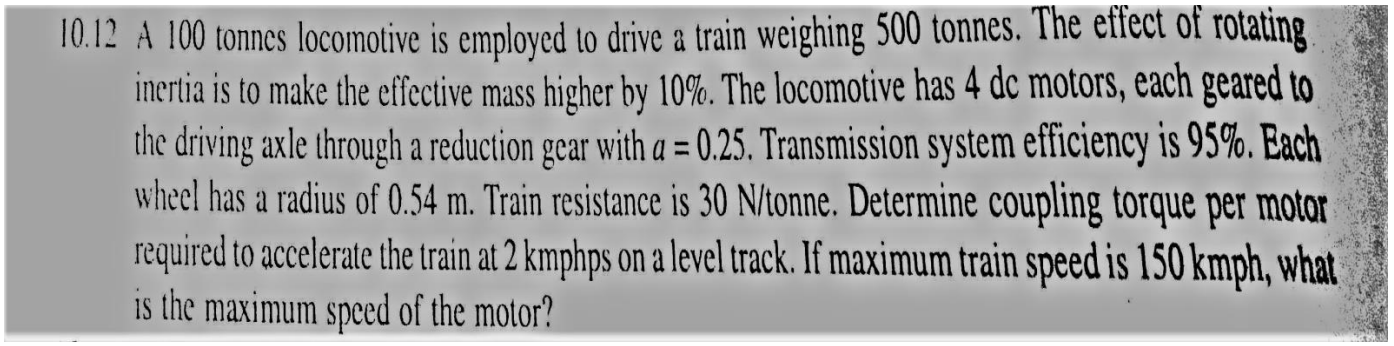
Assignment

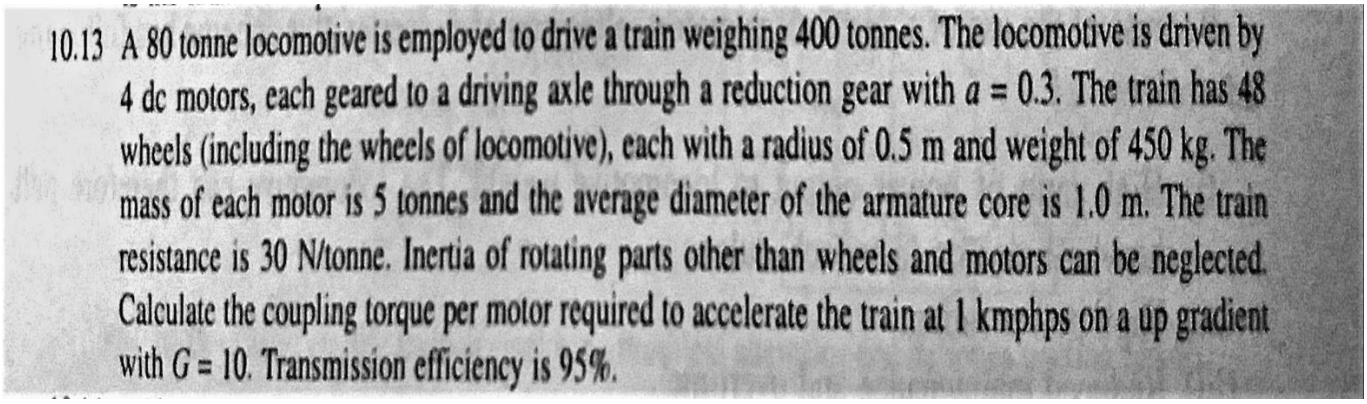
2016 spring (6.a)



10.12 A 100 tonnes locomotive is employed to drive a train weighing 500 tonnes. The effect of rotating inertia is to make the effective mass higher by 10%. The locomotive has 4 dc motors, each geared to the driving axle through a reduction gear with $a = 0.25$. Transmission system efficiency is 95%. Each wheel has a radius of 0.54 m. Train resistance is 30 N/tonne. Determine coupling torque per motor required to accelerate the train at 2 kmphps on a level track. If maximum train speed is 150 kmph, what is the maximum speed of the motor?

Ans:13666.8Nm, 2947.3 rpm

2014 Fall (6.a)



10.13 A 80 tonne locomotive is employed to drive a train weighing 400 tonnes. The locomotive is driven by 4 dc motors, each geared to a driving axle through a reduction gear with $a = 0.3$. The train has 48 wheels (including the wheels of locomotive), each with a radius of 0.5 m and weight of 450 kg. The mass of each motor is 5 tonnes and the average diameter of the armature core is 1.0 m. The train resistance is 30 N/tonne. Inertia of rotating parts other than wheels and motors can be neglected. Calculate the coupling torque per motor required to accelerate the train at 1 kmphps on a up gradient with $G = 10$. Transmission efficiency is 95%.

Ans: 8359.1Nm