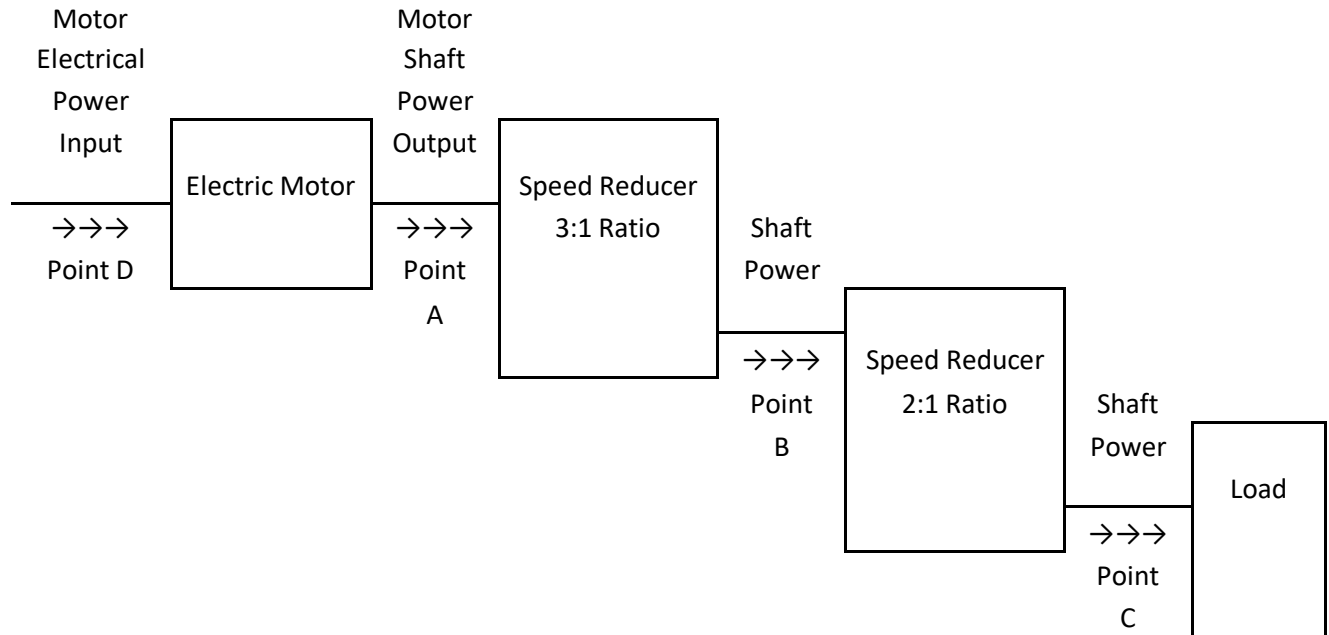A mechanical system consists of an electric motor, a geared speed reducer, a second speed reduction stage using a roller chain, and a load as shown below.

Motor Electrical Power Input	Electric Motor	Motor Shaft Power Output	Speed Reducer 3:1 Ratio	Shaft Power	Speed Reducer 2:1 Ratio	Shaft Power	Load
→→→ Point D		→→→ Point A		→→→ Point B		→→→ Point C	

For this demonstration, use the following values.

Motor Shaft Power Output (Point A): 1.7 kW at 1750 RPM

Given power and shaft speed at point A, show i) how to find the torque at point A and ii) the power, shaft speed, and torque at points B and C in the system. Show this as if each stage has an efficiency of 100%.

Next, show how to find the following:

Discuss how the mechanical efficiency of each stage would affect the power, shaft speed, and torque at each stage. Demonstrate this with the first stage geared speed reducer. Taking a mechanical efficiency of 97%, find the power, shaft speed, and torque at the speed reducer output shaft. Briefly discuss how these numbers differ from the values found for 100% efficiency. Briefly discuss what happens to the lost power.

Find the motor electrical power and current draw for a single-phase motor at a voltage of 220 Volts. Assume the motor has an efficiency of 92% and a Power Factor equal to 1.

Briefly discuss
i)   the relative advantages and disadvantages of a parallel shaft gear drive and a roller chain drive, and
ii)   why a clutch might be included in this system and the best location for a clutch.