Gear Worksheet 1

Example 1

1. A simple gearbox the input shaft rotates at 1500 RPM in a clockwise direction and the output shaft at 300 RPM in an anticlockwise direction. If the input power is 20 KW and the gearbox is 70% efficient determine the following:
a) The gear ratio of the gearbox.
b) The input torque
c) The output power
d) The output torque
e) The holding torque

Answers: a) 5:1 b) 127 Nm (clockwise) c) 14kW d) 445 Nm (anticlockwise) e) -318 Nm

Example 2

2. The input shaft of a gear box rotates clockwise with an input speed of 2000 RPM, whilst the output shaft rotates at 500 RPM. If the input power is 50 KW and the gearbox is 60% efficient calculate the following:

a) The input torque
b) The output power
c) The output torque
d) The holding torque
e) The directional of rotation of the output shaft.

 Answers: a) -238 Nm b) 30kW c) 573 Nm d) -334 Nm e) anticlockwise

Example 3

A gear box must produce an output power and torque of 40 kW and 60 Nm when the input shaft rotates at 1000 rev/ min. Determine the following:

a) The gear ratio
b) The input power assuming an efficiency of 70 %

Answers: a) 0.1571 b) 57.14 kW

Example 4

A simple train has 2 gears. Gear A is the input and has 50 teeth. Gear B is the output and has 150 teeth. Gear A rotates at 1500 rev/min anticlockwise. The input torques on A is 12 Nm and the efficiency is 75%.

Calculate:

1) GR and output speed

2) Output Power

3) Output torque and the holding torque

Answer: 1) 3:1 500rpm clockwise 2) 1.41 kW 3) 27 Nm(clockwise) T3= 15Nm

Example 5

Calculate the GR for the compound chain shown, if Gear A has 20 teeth, Gear B 100 teeth, Gear C 40 teeth & Gear D 100 teeth. If the input gear rotates clockwise, in which direction does the output rotate?

Answer: 1) 12.5:1 clockwise

Example 6

Compound gear box shown here has an input gear A that revolves at 1200 rev/min clockwise viewed from the left end. The input torque is 30Nm and the efficiency is 70%.

If :

Gear A has 50 teeth

Gear B has 150 teeth

Gear C has 30 teeth

Gear D has 60 teeth

Answer: Calculate: 1. Gear ratio -6:1 2. Output speed and its direction – 200 rpm clock 3. Input and output power – 3.77 kW 2.64kW 4. Output and holding torque – -126 Nm, 156 Nm