



# MECHANICAL ENGINEERING SCIENCE

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**Numericals on Gear Drives**

**The following data relate to two meshing gears –**

**Velocity ratio –  $1/3$**

**Module = 4 mm**

**Centre distance = 200mm**

**Determine the number of teeth of both the gears.**

### Solution

$$(i) \quad VR = \frac{N_2}{N_1} = \frac{1}{3} = \frac{T_1}{T_2} \quad \text{or} \quad T_2 = 3T_1$$

$$\text{and} \quad C = \frac{d_1 + d_2}{2} = \frac{m(T_1 + T_2)}{2}$$

$$\text{or} \quad 200 = \frac{4(T_1 + 3T_1)}{2} = 8T_1$$

$$\text{or} \quad T_1 = 25 \text{ and} \quad T_2 = 25 \times 3 = 75$$

**A pair of spur gears consists of a 20 teeth pinion meshes with a 120 teeth gear. The module is 4 mm. Calculate the center distance, pitch circle diameter of pinion and gear, and the gear ratio.**

***Given Data***

Number of teeth on pinion:  $T_p = 20$

Number of teeth on gear:  $T_g = 120$

Module:  $m = 4 \text{ mm}$

Formula for pitch circle diameter:

$$D = m \times T$$

So:

- Pitch diameter of pinion:

$$D_p = m \times T_p$$

$$D_p = 4 \times 20 = 80 \text{ mm}$$

- Pitch diameter of gear:

$$D_g = m \times T_g$$

$$D_g = 4 \times 120 = 480 \text{ mm}$$

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The **center distance** between two meshing gears is:

$$C = \frac{D_p + D_g}{2} = \frac{m(T_p + T_g)}{2}$$

$$C = \frac{4 \times (20 + 120)}{2} = \frac{4 \times 140}{2} = \frac{560}{2} = 280 \text{ mm}$$

Gear ratio  $i$  is:

$$i = \frac{T_g}{T_p}$$

$$i = \frac{120}{20} = 6$$

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1. A spur gear has 40 teeth and a pitch circle diameter (PCD) of 200 mm. Calculate the module of the gear.
2. A spur gear has 24 teeth and a module of 4 mm. Find the pitch circle diameter of the gear.



# THANK YOU

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