Spur Gears Tutorial Sheet A

1. A pinion gear with 24 teeth and a module of 2 mm has a rotational speed of 1800 rpm and drives a gear at 450 rpm. Determine:
   a) The number of teeth on the gear;
   b) The circular pitch, and;
   c) The theoretical centre distance.

   [Ans: 96 teeth; 6.28 mm; 120 mm]

2. The theoretical centre distance between two spur gears is 325 mm, and the required speed reduction is 2.25:1. If the gears have a module of 5 mm, determine:
   a) The pitch (reference) diameters of the two gears.
   b) The number of teeth on each gear.
   c) The circular pitch of the teeth.
   d) The addendum.
   e) The dedendum.

   [Ans: 200 mm, 450 mm; 40 teeth, 90 teeth; 15.71 mm; 5 mm; 6.25 mm]

3. The double-reduction (compound) gear train shown in Figure 2.10 is driven by a motor attached to the shaft on which Gear A is mounted and this rotates at 1720 rpm. The reduction between Gears A and B is 3.5:1, and between Gears C and D is 4:1. Given that the number of teeth on the pinion (Gear A) is 24, and on the output gear (Gear D) is 160 teeth, determine:
   a) The number of teeth on the Gears B and C.
   b) The speed of the Gears B, C and D.

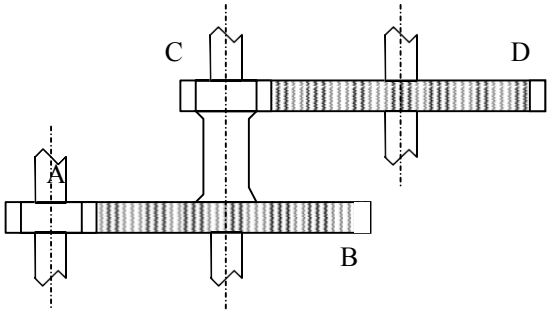

Figure 2.10 Spur Gear arrangement for Tutorial Q3

[Ans: 84 teeth, 40 teeth; 491.43 rpm, 122.86 rpm]

4. A gear with 60 teeth and a module of 4 mm has a rotational speed of 325 rpm and is driven by a pinion rotating at 1300 rpm. Determine:
   a) The number of teeth on the pinion;
   b) The circular pitch;
   c) The theoretical centre distance;
   d) The torque on each gear for an input power of 6.1 kW, and assuming that the pressure angle is 20^0;
   e) The forces on each gear, shown clearly on a free body diagram.

[Ans: 15 teeth; 12.57 mm; 150 mm; 44.81 Nm, 179.23 Nm; $F_{tp} = F_{tg} = 1493.61$ N, $F_{rp} = F_{rg} = 543.63$ N]