# Sheet (4)

# Belt drive

1- Find the power that can be transmitted from a 200 mm pulley to a 400 mm one. The two pulleys are 1.5 m apart. The small pulley rotates at 900 rpm and the belt is 50 x 5 mm. You may assume a coefficient of friction between the belt and pulley of 0.3 and the belt weight 11 kN/m$^3$. Let $\sigma_{all}$ = 2 MPa for belt material.

2- Find the number of V-belt required to transmit 2 kW from a motor running with 900 rpm and has a sheave diameter of 200 mm to 400 mm sheave 1.5 m apart. Assume $\mu$ = 0.3, W = 11 kN/m$^3$, A = 140 mm$^2$, $\sigma_{all}$ = 2 MPa, groove angle = 38$^o$, service factor is unity.

3- Find the number of 80 mm$^2$ V-belts required to transmit 5 kW from a 200 mm sheave running with 900 rpm to another sheave 1 m apart with a reduction ratio of 3:1. The belt weight 11 kN/m$^3$ and has $\sigma_{all}$ = 2 MPa. You may assume $\mu$ = 0.3 and the groove angle is 38$^o$. The service factor is 1.2.

4- Find the maximum power and its corresponding belt speed that can be delivered by a 50 x 4 mm flat belt with a least angle of contact 2.5 rad. If the following specifications are given $\sigma_{all}$ = 2 MPa, $\mu$ = 0.3, W = 10.5 kN/m$^3$.

5- Find the maximum power and its corresponding belt speed that can be transmitted through a V-belt drive. The drive specifications are:-

- $\sigma_{all}$ = 2.5 MPa
- Belt cross-section are = 80 mm$^2$
- 3 belts are used
- $\mu$ = 0.3, $2\beta$ = 38$^o$
- Belt weight 11 kN/m$^3$
- Minimum angle of contact = 2.5 rad
- Motor sheave diameter is 200 mm