



**Question Four**

**(25 marks)**

It is required to design a rigid type of flange coupling to connect two shafts. The input shaft transmits 37.5 kW power at 180 rpm to the output shaft through the coupling. The service factor for the application is 1.5, i.e., the design torque is 1.5 times of the rated torque. Select suitable materials for various parts of the coupling, design the coupling and specify the dimensions of its components. (Please draw the coupling based on the calculated dimensions).

**Question Five**

**(25 marks)**

The following data is given for an open-type V-belt drive:

diameter of driving pulley = 150 mm; diameter of driven pulley = 300 mm;  
center distance = 1 m; groove angle =  $40^\circ$ ; mass of belt = 0.25 kg/m;  
maximum permissible tension = 750 N; coefficient of friction = 0.2

- a) Plot a graph of maximum tension and power transmitted against the belt velocity.
- b) Calculate the maximum power transmitted by the belt and the corresponding belt velocity. Neglect power losses.