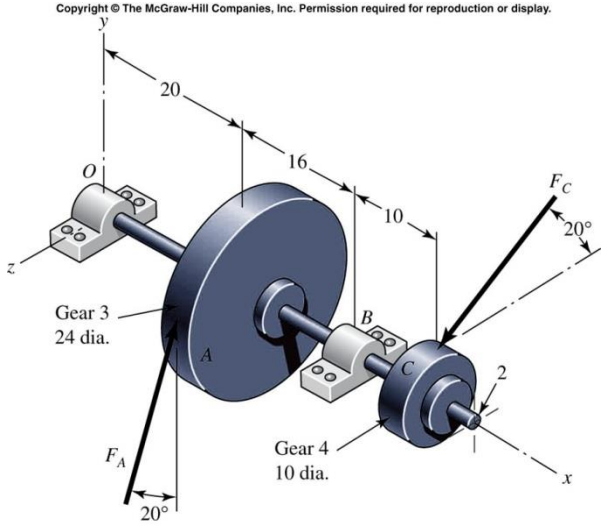
King Saud University
Department of Mechanical Engineering
ME305 Machine Design

Home work No. (6)

Rolling-Contact Bearings

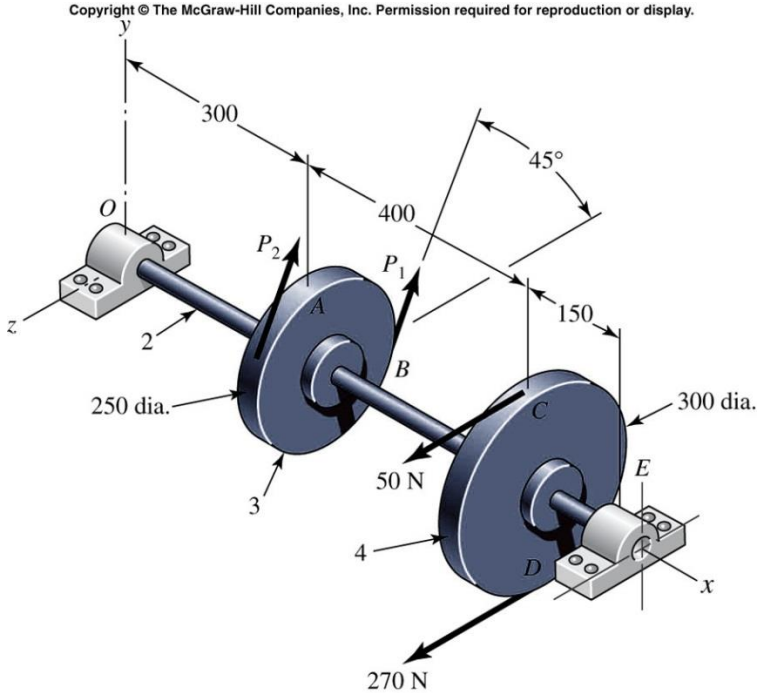
Question 1

The figure shown is a geared countershaft with an overhanging pinion at *C*. Select an angular-contact ball bearing from Table 11-2 for mounting at *O* and a straight roller bearing for mounting at *B*. The force on gear *A* is F_A = 600 lbf, and the shaft is to run at a speed of 480 rev/min. Solution of the statics problem gives force of bearings against the shaft at *O* as $\mathbf{R}_O$ = -387**j** + 467**k** lbf, and at *B* as $\mathbf{R}_B$ = 316**j** – 1615**k** lbf. Specify the bearings required, using an application factor of 1.4, a desired life of 50 000 h, and a combined reliability goal of 0.90.



Question 2

The figure is a schematic drawing of a countershaft that supports two V-belt pulleys. The countershaft runs at 1200 rev/min and the bearings are to have a life of 60 kh at a combined reliability of 0.999. The belt tension on the loose side of pulley *A* is 15 percent of the tension on the tight side. Select deep-groove bearings from Table 10-2 for use at *O* and *E*, each to have a 25-mm bore, using an application factor of unity.



Question 3

The power-transmitting system shown in figure consists of a helical gear, a bevel gear, and a shaft that rotates at 150 rpm and is supported by two bearings. The load on the bevel gear is: $\vec{P} = -0.5P\vec{i} - 0.4P\vec{j} + 0.44P\vec{k}$. The left bearing supports the axial load on the shaft.

1. Find the two bearing reactions at 0 and B. Then write the load at each bearing as a radial and thrust loads.
2. Select an **Angular-Contact Ball Bearing** at **0** and a **Cylindrical Roller Bearing** at **B**. The bearings suppose to have 16000 hr life, a combined reliability goal of 0.9, and an application factor of 1.2.