Arab Academy for Science and Technology

Faculty of Engineering — **Mechanical Engineering**
March 2018 — **Stress Analysis**

Time Allowed: 1 hour

Answer the following two questions at the same paper:

QUESTION ONE (15 points):

A compressor of weight W is suspended from a sloping ceiling beam by long rods AB and CD of diameters d_1 and d_2, respectively, as shown in Fig. 1.a. A typical bracket is shown in Fig. 1.b. Using the data given below, determine the allowable compressor weight, $W_{allow.}$. (Neglect the weight of the platform between A and C, and neglect the weight of the two rods. Also, assume that rod AB and the pins at A and B are large enough that they do not need to be considered.)

Rod CD: d_2=100 mm σ_{all}=85 MPa
Pins at C and D: d_p=7 mm τ_{all}=100 MPa
a = 0.75 m, b = 0.5 m

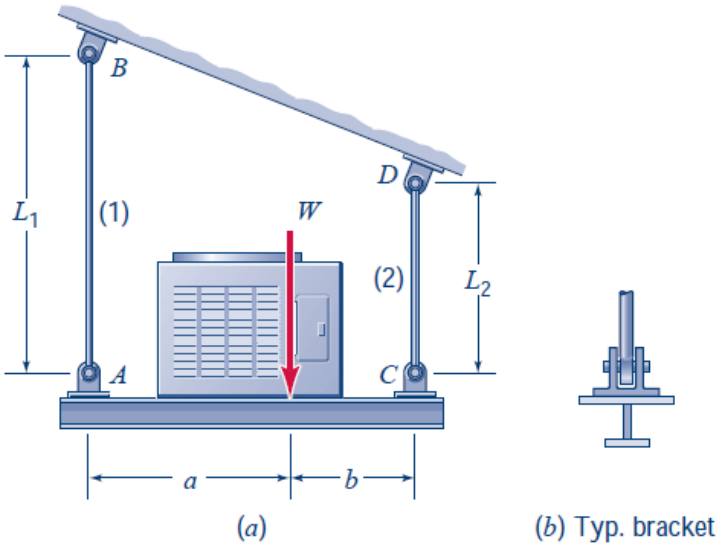

Figure 1.

QUESTION TWO (15 points):

The The drive shaft of an inboard motor boat (Fig. 2) is required to deliver 100 hp at 300 rpm. A shaft is to be selected from the following group of available shafts: A(d_{oA} = 4.826 cm, d_{iA} = 4.09 cm), B(d_{oB} = 4.826 cm, d_{iB} = 3.81 cm), C(d_{oC} = 4.826 cm, d_{iC} = 3.053 cm). Select the lightest shaft that meets an allowable shear stress requirement of τ_{all} = 0.137 Gpa. (1hp = 0.7457 KW)

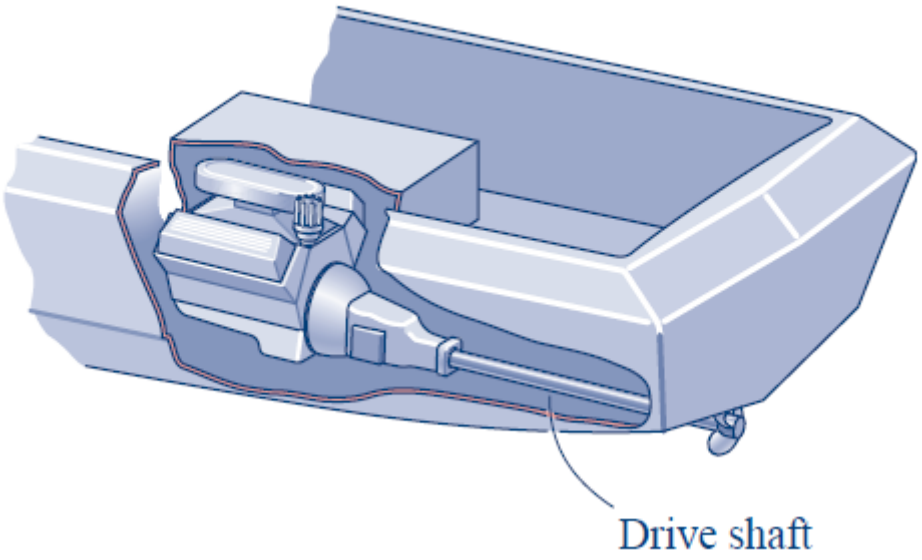

Figure 2.