# College of Engineering & Technology

Department: Mechanical Engineering   Marks: 15
Lecturer: Dr. Rola Afify               Time: 2.30 - 4.00
Course Code: ME356                     Date: 06/11/2012

**Answer the following questions:**

## Question one (5 marks)

**A 30 mm diameter rod, shown in Fig.1, is subjected to a force of 20 kN and a moment of 30 N.m. Calculate the stresses at A and B. Also, use neat sketches to show these stresses.**
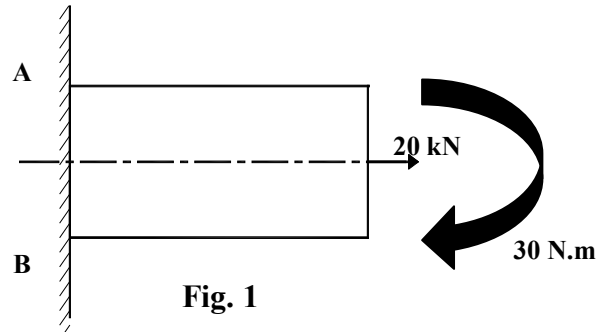
A

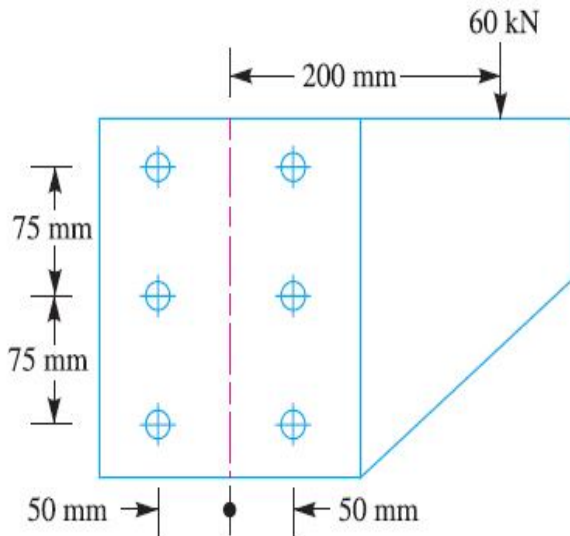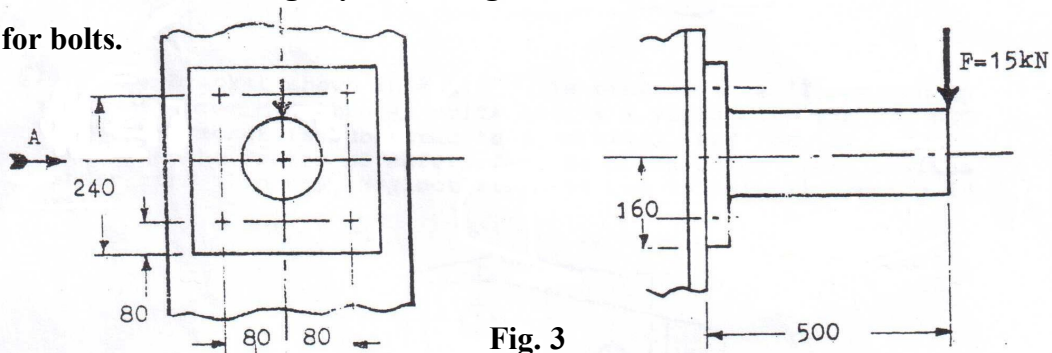20 kN

30 N.m

B

**Fig. 1**

60 kN

200 mm

75 mm

75 mm

50 mm          50 mm

**Fig. 2**

## Question two (5 marks)

**A bracket is bolted to a column by 6 bolts of equal size as shown in Fig.2. It carries a load of 60 KN at a distance of 200 mm from the center of the column. If the maximum shear stress in the rivet is limited to 150 MPa, determine the diameter of bolts.**

## Question three (5 marks)

**The member, shown in Fig.3, is bolted to a stanchion by means of four M8 through bolts made of Nickel steel having a yield strength of 620 MPa. Determine the least factor of safety for bolts.**

A

240

80

80   80

160

F=15kN

500

**Fig. 3**
Dimensions in mm