	Alexandria Higher Institute of Engineering & Technology (AIET)	
IE Department		1st Year
ME142	Design of Machine elements	Final, June, 10, 2012
Examiners:	Dr. Rola Afify and committee	Time: 3 hour

Answer the following questions:

Question one (10 marks)

a) Define the keys and pins. Also, name their types.

b) A bracket is supported by means of 4 bolts of the same size, as shown in Fig.1. Determine the diameter of the bolts if the maximum shear stress is 140 MPa.
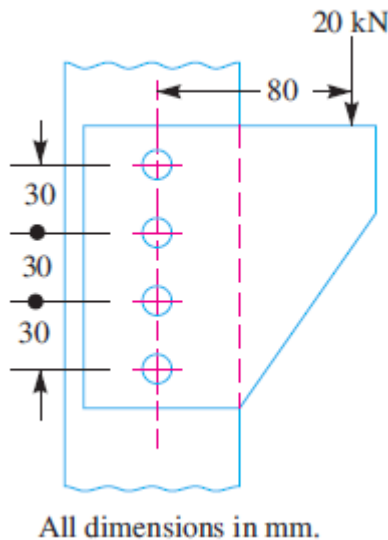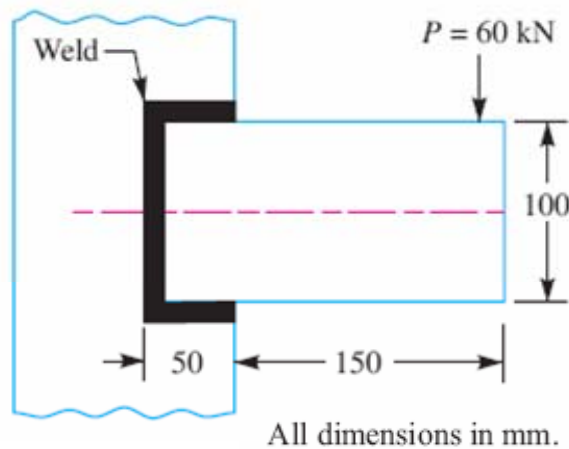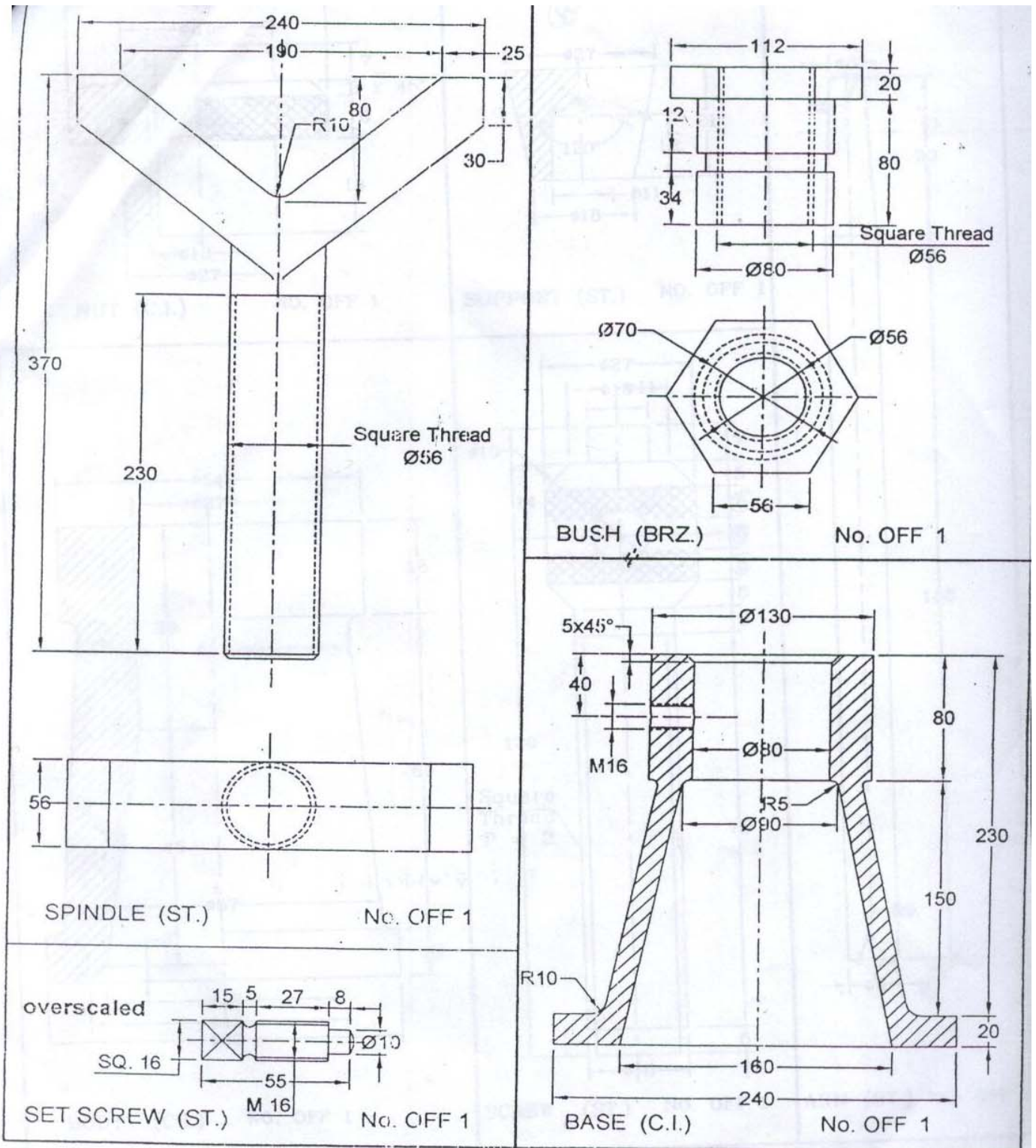

Fig. 1

Fig. 2

Question two (10 marks)

a) Discuss, using neat sketches, types of fillet welding.

b) A rectangular steel plate is welded as a cantilever to a vertical column and supports a single concentrated load P, as shown in Fig. 2. Determine the weld size if shear stress in the same is not exceed 140 MPa.

Question three (10 marks)

a) What are the disadvantages of using belt drive ?

b) 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.

You may use this $\theta_1 = 180 - 2\sin^{-1}\left(\dfrac{d_2 - d_1}{2C}\right)$

Question Four (30 marks)

240
190
25
80
R10
30
370
230
Square Thread Ø56
56
SPINDLE (ST.)   No. OFF 1

overscaled
15 5 27 8
Ø10
SQ. 16
55
M 16
SET SCREW (ST.)   No. OFF 1

112
20
12
80
34
Square Thread Ø56
Ø80

Ø70
Ø56
56
BUSH (BRZ.)   No. OFF 1

5x45°
40
Ø130
M16
80
R5
Ø80
Ø90
230
R10
150
20
160
240
BASE (C.I.)   No. OFF 1

You are given the details of a **SCREW JACK**. Assemble all parts, with spindle fixed at 50 mm from the Bush, and draw the following views.

      a) SEC ELEVATION   b) PLAN

                           All dimension in mms