	Alexandria Higher Institute of Engineering & Technology (AIET)		
	Industrial Department		First Year
	ME142	Design of Machine elements	Final, June, 21, 2014
	Examiners:	Dr. Rola Afify and Prof. Ahmed Elaskary	Time: 3 hour

**Answer the following questions:**

**Question one (10 marks)**

- Mention two types of keys and pins (using neat sketches).
- A bracket is riveted to a column by 6 rivets of equal size as shown in Fig.1. 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 the rivet.

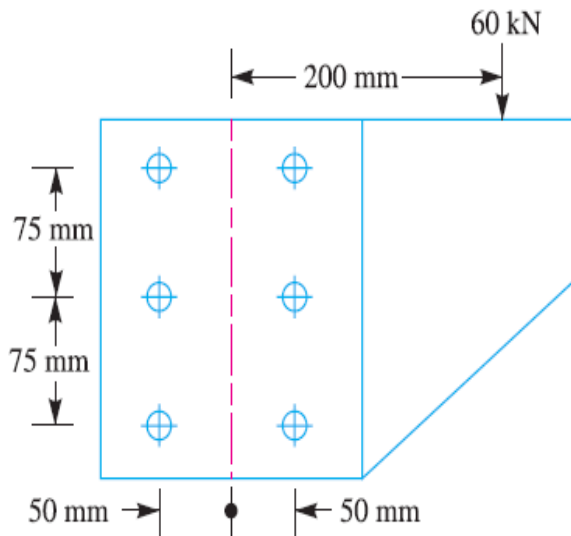


Fig.1

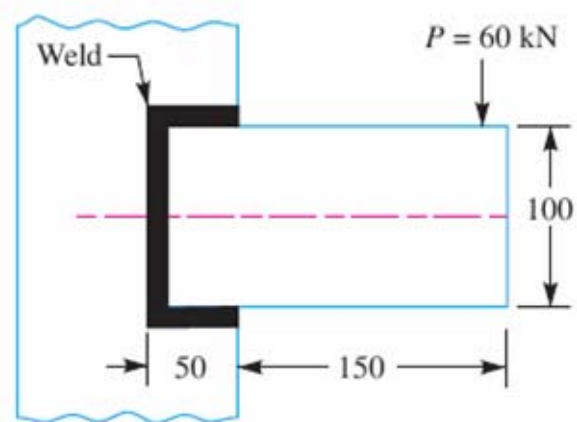


Fig. 2

**Question two (10 marks)**

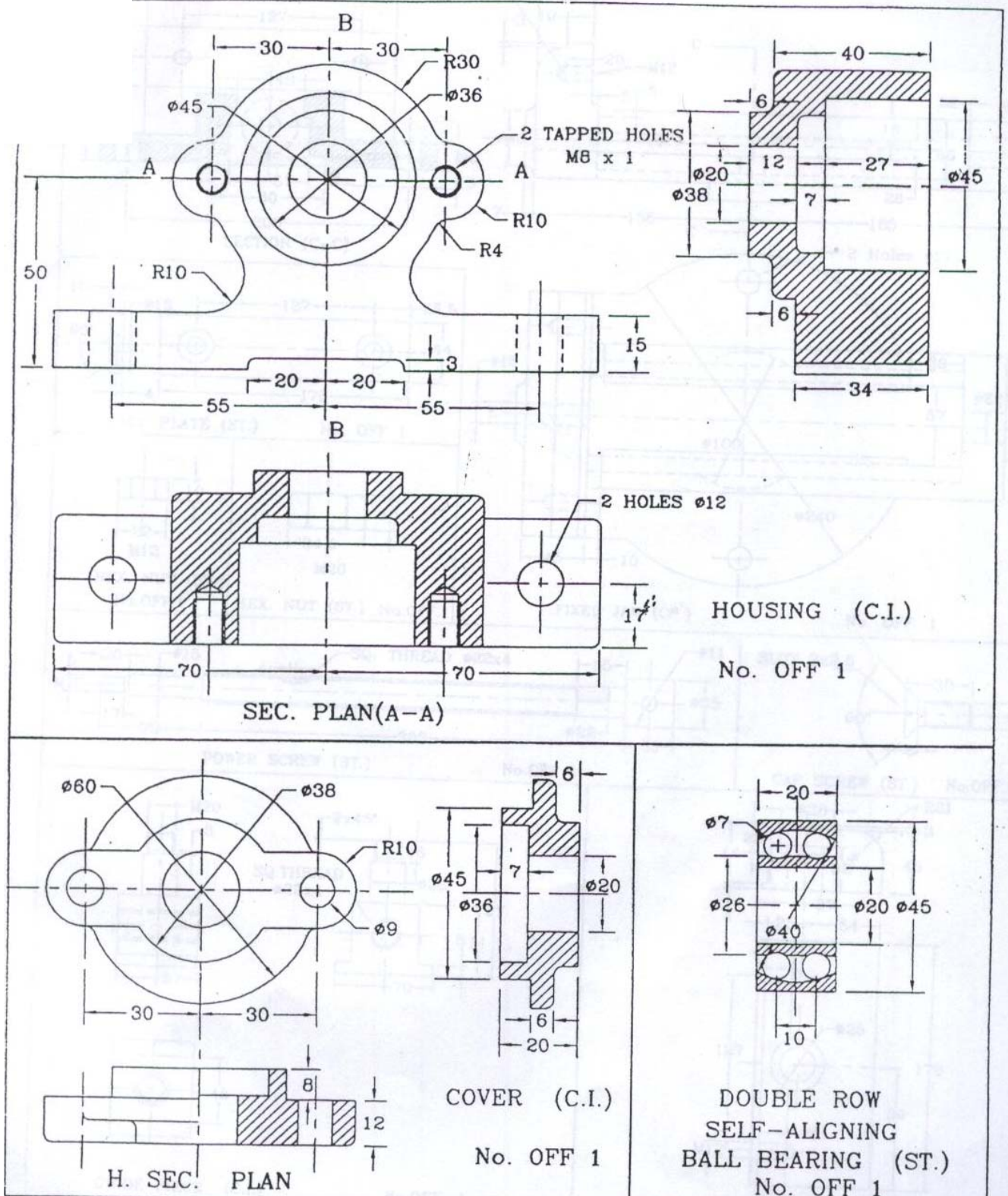
- Discuss, using neat sketches, types of fillet welding.
- A rectangular steel plate is welded as a cantilever to a vertical column and supports a single concentrated load P, as shown in Fig. 2. Determine the weld size if shear stress is not exceed 140 MPa.

**Question three (10 marks)**

- What are the advantages of using belt drive ?
- 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<sup>3</sup>. Let  $\sigma_{all} = 2$  MPa for belt material.

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

**Question Four (30 marks)**



You are given the details of a **BALL BEARING ASSEMBLY**. Assemble the bearing in position and secure the cover with two M8 Tap bolts. Draw the following views.

a) ELEVATION

b) SEC. SIDE VIEW

All dimension in mm.

All unspecified radii are R3