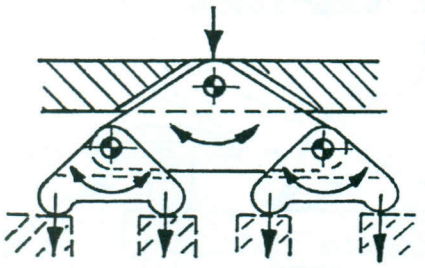
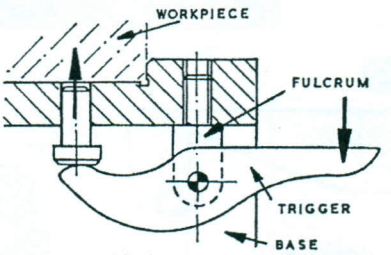
Mansoura University	**1st Term 2012/2013**	**4th Year**
Faculty of Engineering	**Jig & Fixture and Tool Design**	**110 marks**
Dept. of Prod. & Mech. Design	**01/01/2013**	**3 Hours**

First Question: (15 marks)

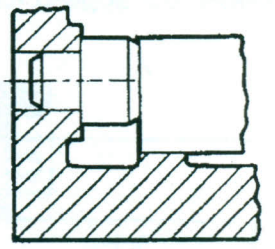
Name only the following figures with their suitable locating or clamping system.**(3 marks each)**



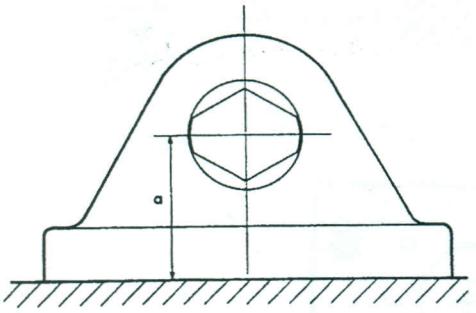
(a)



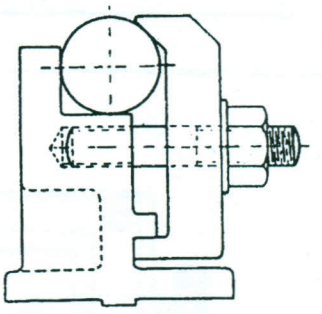
(b)



(c)



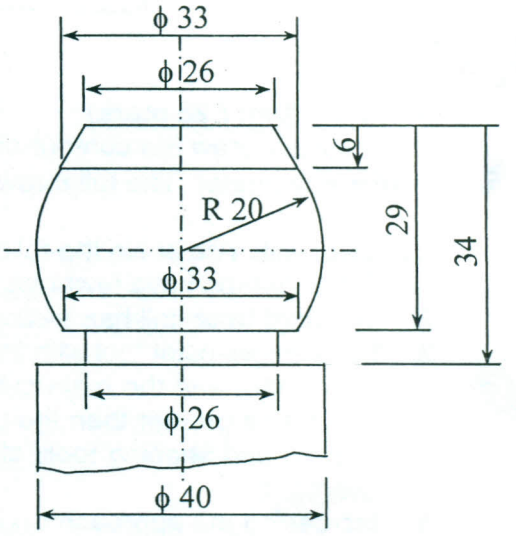
(d)



(e)

Second Question: (40 marks)

a) Graphically find the profile of the flat form tool required to produce the product shown in figure. This tool is to have 15° front clearance angle and zero degree rake angle. **(20 marks)**



b) Prove analytically that the depth (P_2) of a flat form tool with positive rake angle is in the form:

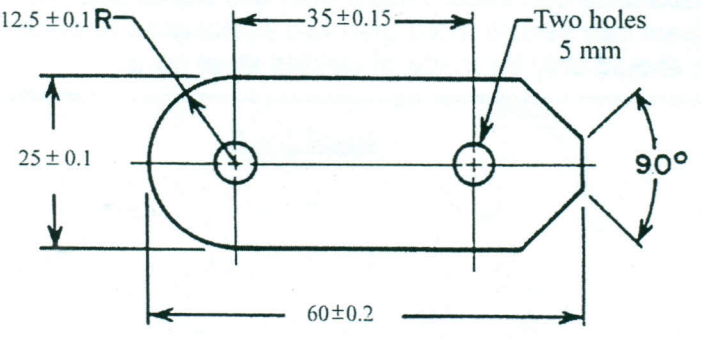
$$P_2 = \{\sqrt{r_2^{\,2} - (r_1 \sin\gamma)^2} - r_1 \cos\gamma\}\cos(\gamma + \alpha)$$

(10 marks)

c) Draw with neat sketch and explain the principle of insert held by cutting forces of a single-point tool. **(10 marks)**

Third Question: (15 marks)

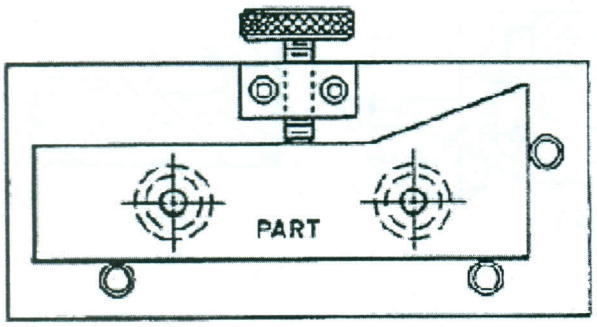
To drill the two holes of 5 mm in diameter for the workpiece shown in figure, using the principle design of Vee pads, draw the required locating system. **The draw must be with suitable scale.**



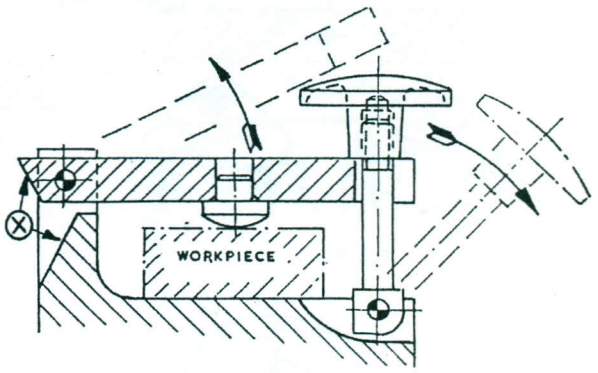
Thickness 10±0.3

Fourth Question: (15 marks)

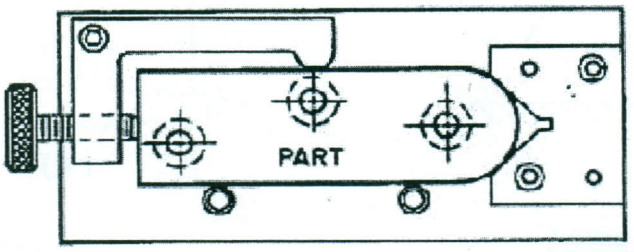
Find out the lever system used in a, b and c of the following figure. Also, write the relationship between the applied force and the workpiece clamping force. (5 marks each)



(a)



(b)



(c)

Fifth Question: (25 mark)

a) Graphically draw the contour of a spiral cam with 3 mm rise between two circles of 50 and 56 mm in diameter. The full throw of the required cam is 72°. **(15 marks)**

b) Answer with Yes or No the following statements. **(10 marks)**

1. Direct clamps have fewer parts and not simpler operation.
2. Standard twist drill has a constant rake angle with straight lips.
3. For a single-point tool with insert held by the cutting forces, the angle between the resultant component and the main cutting direction should not be smaller than the clearance angle, and not be greater than the cutting edge angle.
4. Planing and shaping tools should have an offset with radius of curvature less then the tool overhang.
5. Increasing the approach angle of a single-point tool increases the feed force component.
6. Locating with centralizer is more closely defined and more accurate than nesting.
7. Supports are used when the part does not have sufficient rigidity to withstand the operating forces without distortion.
8. Plate clamp equalizers can secure more than two workpieces at once.
9. Rocker equalizers can secure more than two workpieces at once.
10. Fixture bodies should only be made of welded steel parts.

Good Luck