UNIVERSITY COLLEGE TATI

UNIVERSITY COLLEGE TATI (UC TATI)

FINAL EXAMINATION QUESTION BOOKLET	
COURSE CODE	: DTD 1022
COURSE	: JIGS AND FIXTURES DESIGN
SEMESTER/SESSION	: 1-2021/2022
DURATION	: 3 HOURS

Instructions:

1. This booklet contains 5 questions. Answer **all** questions.
2. All answers should be written in answer booklet.
3. Write legibly and draw sketches wherever required.
4. If in doubt, raise your hands and ask the invigilator.

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO

THIS BOOKLET CONTAINS 4 PRINTED PAGES INCLUDING COVER PAGE

QUESTION 1

a) **Explain** the meanings of jigs and fixtures used in workshop environment. Give one example for each. (6 marks)

b) **Describe** the purpose of jigs and fixtures used in industries. (4 marks)

c) **State** three (3) aims of using jigs and fixtures for high volume or mass production. (6 marks)

d) **Distinguish** between a "Production device" and "Inspection device" for the workpiece for a specific machining job. (4 marks)

QUESTION 2

a) **Explain** what is the tool design and its role when dealing with high speed and high volume production. (6 marks)

b) **Define** the term "Productivity" when using jigs and fixtures to facilitate the process in the production working environment. (4 marks)

c) **Explain** what are the additional elements required to classify the jigs and fixtures. (4 marks)

d) **Explain** the construction of plate jigs. Sketch the diagram to show how to locate and clamp the workpiece using this jig. (6 marks)

QUESTION 3

a) **Illustrate** how to restrict the movement and positioned part properly. (4 marks)

b) **List** the points should be kept in designer mind when designing the jigs or fixtures. (3 marks)

c) **Explain** the methods of locating from a flat surface. Select one (1) method and sketch the diagram to support your answer. (7 marks)

d) **Interpret** the fool proofing stand for and why this method is needed for locating the workpiece. Sketch the diagram to show how this method is done before machining the work. (6 marks)

QUESTION 4

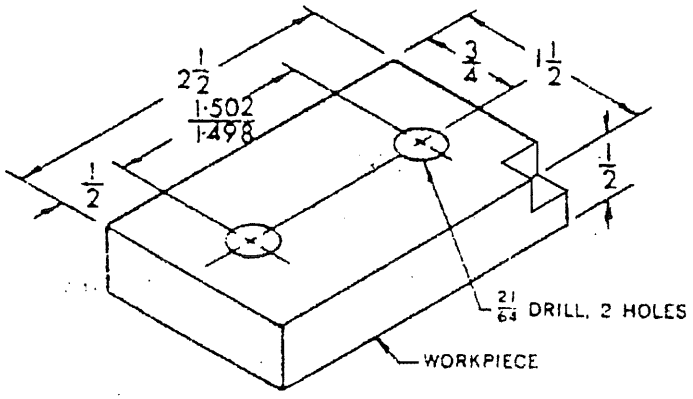

Figure – 1

a) In the figure – 1 shown above is a workpiece called ***Block Support***. Two holes needed to be drilled on one side of the support. In order to make sure correct and secured position is drilled, ***sketch*** a simple maximum three views to ***identify relevant supports*** and ***locators***. Also add or **identify *fool proofing element*** to the sketch given.

Note: ***No dimension needed in the sketch.***

(16 marks)

b) **Explain** what is the potential error that might occur if no fool proofing element added to the design of the jigs. (4 marks)

QUESTION 5

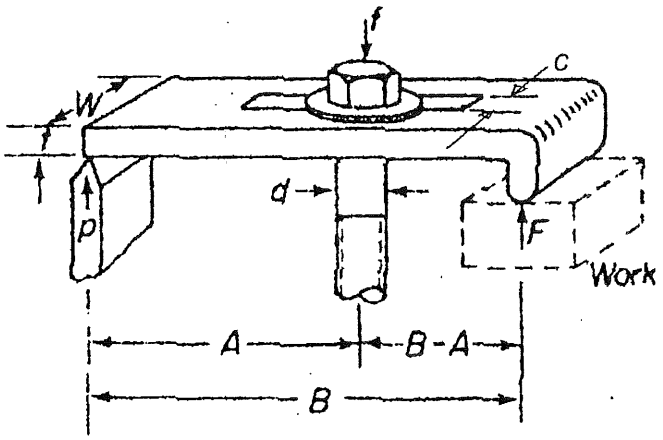

Figure – 2

From figure – 2 as shown above, assuming an ***10 inch long*** open-end wrench is used to tighten a ***½ - 10 bolt*** *(Diameter of bolt d =½)* . A force of ***15 lb*** is exerted at the end of the wrench.

Solve the values of the following requirements:

i. The necessary width of the clamp.
ii. The thickness of the clamp.
iii. The load on the bolt.
iv. The moment on the strap.
v. The working stress on the clamp.
vi. The safety factor if the ultimate stress of the clamping material is ***65,000psi***
vii. The maximum radial load that can be applied to this bolt.

Note: ***A = 4 in***; ***B = 6 in***; ***c = ½ + 1/16 = 0.5625*** (slot opening);
Torque (T) = 10x15 = 150 in-lb.

(20 marks)

$[W = 2.3d+0.062;\ t = \sqrt{(0.85dA(1-A/B))};\ T = df/5;\ M = \frac{fA(B-A)}{B};\ sec.mod. = \frac{(W-c)(t)^2}{6};$
$S = M/(sec.mod.);$
$d = 1.35\sqrt{(f/s)}].$

----------End of question----------