UNIVERSITY COLLEGE TATI

UNIVERSITY COLLEGE TATI (UC TATI)

FINAL EXAMINATION QUESTION BOOKLET	
COURSE CODE	: BME 2093
COURSE	: PRESS TOOL DESIGN
SEMESTER/SESSION	: 2-2024/2025
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 5 PRINTED PAGES INCLUDING COVER PAGE

QUESTION 1

a) **Differentiate** between cut-off and parting-off process. (3 marks)

b) **Sketch** the guide plate tool and name all the plates. (3 marks)

c) **Distinguish** between piercing and blanking process in press tool. (3 marks)

QUESTION 2

a) **Explain** the term "Theory of Shearing" in stamping process. (3 marks)

b) **Discuss** the critical stages of shearing for cutting the sheet of and show the graph of these critical stages. (3 marks)

c) **Explain** one method can be used to reduce cutting force. **Sketch** the diagram to support your answer. (3 marks)

QUESTION 3

a) **Explain** what the cutting clearance is and how to calculate the value of cutting clearance. (4 marks)

b) **Explain** what the effects are if the excessive and insufficient cutting clearance were used for tooling referring to burr size and cut band. (8 marks)

c) **Explain** what the land and clearance angle are. **Sketch** the diagram to support your answer. (8 marks)

d) **Illustrate how** to remove the blank in case of straight wall without angular clearance is used? **Sketch** the diagram to support your answer. (8 marks)

QUESTION 4

a) **Classify** the punches used in the press tool. Sketch these punches and what are the operation can be done through these punches. (8 marks)

b) **Distinguish** between travelling and fixed stripper. Sketch the diagram to show these types of strippers. (8 marks)

c) **List** FIVE (5) factors which are influenced the design of a die block. (5 marks)

d) **Explain** the differences between solid die and split die. Sketch the diagram to support your answer. (6 marks)

QUESTION 5

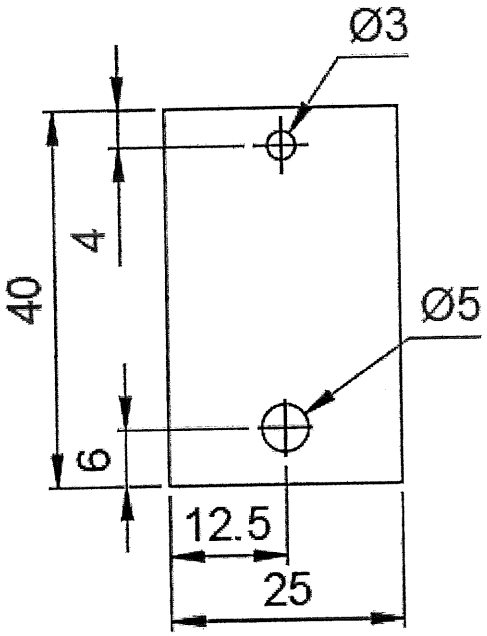
Refer to figure PT1 to answer this question.

a) **Explain** why the component has to be studied first before designing the strip layout for a particular tooling. (6 marks)

b) **Sketch** the strip layout for the component and **state** clearly the process. Use direct piloting according to component design. (6 marks)

c) **Calculate** the following for designing the tool as shown in Figure PT1.

i. Economic factor (use scrap bridge 2.0 mm) (3 marks)
ii. Total cutting force to shear the component (9 marks)
iii. Machine tonnage (3 marks)



NOTES:
a. Material: Steel 0.6%
b. Thickness: 1 mm
c. Tensile strength: 40 kg/mm^2

Figure PT1 Bracket

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

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Criteria	Marks
All question answered will be marked according to the answer schema	/100

APPENDIX 1

Side Scrap and Scrap bridge

Sheet Thickness (mm)	Strip Width (mm)			
	Up to 10	10 - 50	50 - 100	100 - 150
0.5	1.5	2.0	3.0	3.5
1.0	1.0	1.75	2.0	2.5
1.5	1.5	2.0	2.5	3.0
2.0	2.0	2.5	3.0	3.5
3.0	2.0	3.5	4.0	4.5

Economic Factor

$$\text{E.F} = \frac{\text{Area of component x No. of Row x 100}}{\text{Width of Strip x pitch}}$$

Cutting/Shearing Force, F

Cutting/Shearing Force, F $= l \times s \times \tau_{max}$

where, l = length of periphery to be cut in mm
s = stock thickness in mm
τ_{max} = shear strength in N/mm^2

Cutting Clearance for sheet thickness up to 3 mm

Clearance (*for one side*) $= C \times s \times \sqrt{\left(\tau_{max}/10\right)}$

Cutting Clearance for sheet thickness above 3 mm

Clearance (*for one side*) $= \left(1.5 \times C \times s - 0.015\right) \times \sqrt{\left(\tau_{max}/10\right)}$

where, C = a constant = 0.01
s = stock thickness in mm
τ_{max} = shear strength in N/mm^2