



(University of Choice)

**MASINDE MULIRO UNIVERSITY OF  
SCIENCE AND TECHNOLOGY  
(MMUST)  
MAIN CAMPUS  
UNIVERSITY EXAMINATIONS  
2021 /2022 ACADEMIC YEAR  
FOURTH YEAR FIRST SEMESTER EXAMINATIONS  
FOR THE DEGREE  
OF  
BACHELOR OF TECHNOLOGY EDUCATION  
(MECHANICAL OPTION)**

**COURSE CODE: TEM 282**

**COURSE TITLE: MECHANICAL TECHNOLOGY AND  
PRACTICE II**

**DATE: 27/4/2022**

**TIME: 8.00-10.00AM**

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**INSTRUCTIONS TO CANDIDATES**

- This paper consists of **FOUR** questions
- ANSWER QUESTION ONE and any other **TWO** QUESTIONS
- ALL symbols have their usual scientific meanings unless stated otherwise

**This paper consists of 5 printed pages Please Turn Over→**

**Question 1 (30 Marks)**

- a) Differentiate between cold working and hot working of materials. (2 marks)
- b) With specific sketches, differentiate between blanking and piecing operations (3marks)
- c) Fig Q 1( c ) shows a punch and die assembly during blanking operation, name the parts labelled A,B,C,D,E and F (3marks)
- d) With respect to sheet metal work and by the aid of sketches show the followings forming operations
- i) V-bend (ii) Edge bending operations (5 marks)
- e) Name any THREE welding processes (3 marks)
- f) Study Fig. Q1(f), and with one reason, identify the type of welding process shown., label the parts marked A to H and briefly explain its working principle. (6 marks)
- g) Define the following terms (i) cold forging (ii) hot forging (iii) Forging (3 marks)
- h) Describe upset forging of metal forming process, mentioning any TWO products that can be produced by this method (5 marks)

**Question 2**

- a) Mention any TWO (2) advantages spot welding (2 Marks)
- b) Describe with the aid of diagrams the following welding processes; Shielded Metal Arc Welding and spot welding (12 Marks)
- c) Describe by the aid of a diagram the principle of Oxyacetylene Welding (6 marks)

**Question 3**

- a) State one use of the following tools with respect to sheet metal; c-clamps, snips, files, mallets (4 Marks)
- b) Write down any FOUR sheet metal layout tools (2 Marks)
- c) Explain the soldering process (3 Marks)
- d) A 1.2m wide strip, 25 mm thick, is fed through a rolling mill with two powered rolls each of radius 250 mm. If the coefficient of friction between the rolls and the work is 0.18 and the rolls are rotating at speed of 100rpm. It is also given that the work material has a

flow curve defined by  $K = 275 \text{ MPa}$  and  $n = 0.15$ .

**(11 marks)**

Determine

- i) The maximum draft possible
- ii) The maximum strain
- iii) Maximum average flow stress
- iv) Rolling force
- v) Rolling power

**Question 4 (20 Marks)**

- a) Write down the three possible friction conditions that can exist during open die forging process **(3marks)**
- b) With the aid of sketches describe the stages of the following **(12 marks)**
  - i) Open die forging
  - ii) Closed die forging
- c) With reference to Fig Q4 (c) answer the questions that follow assuming that the conditions of sliding friction prevail **(5 marks)**
  - i) Write down the equation for the pressure at any point  $x$  from the mid plane
  - ii) Given that the initial height of the billet is 25 mm and that the final height = 6mm. Determine the strain
  - iii) Given that  $h = 6 \text{ mm}$ ,  $L = 100 \text{ mm}$ ,  $\mu = 0.25$ ,  $k = 6 \text{ MPa}$   
Determine the pressure at the point where  $x = 0$ , and where  $x = 50 \text{ mm}$

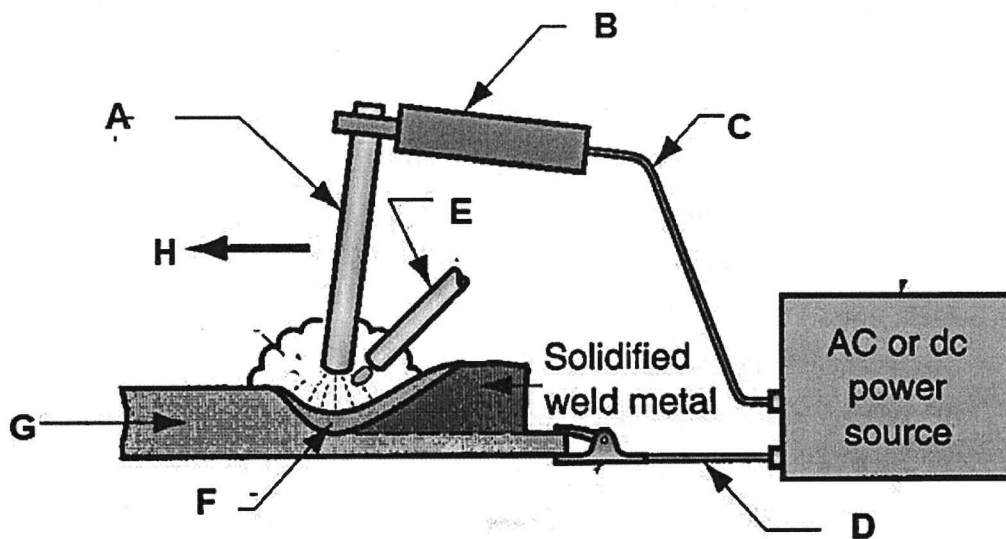


Fig Q1(f)

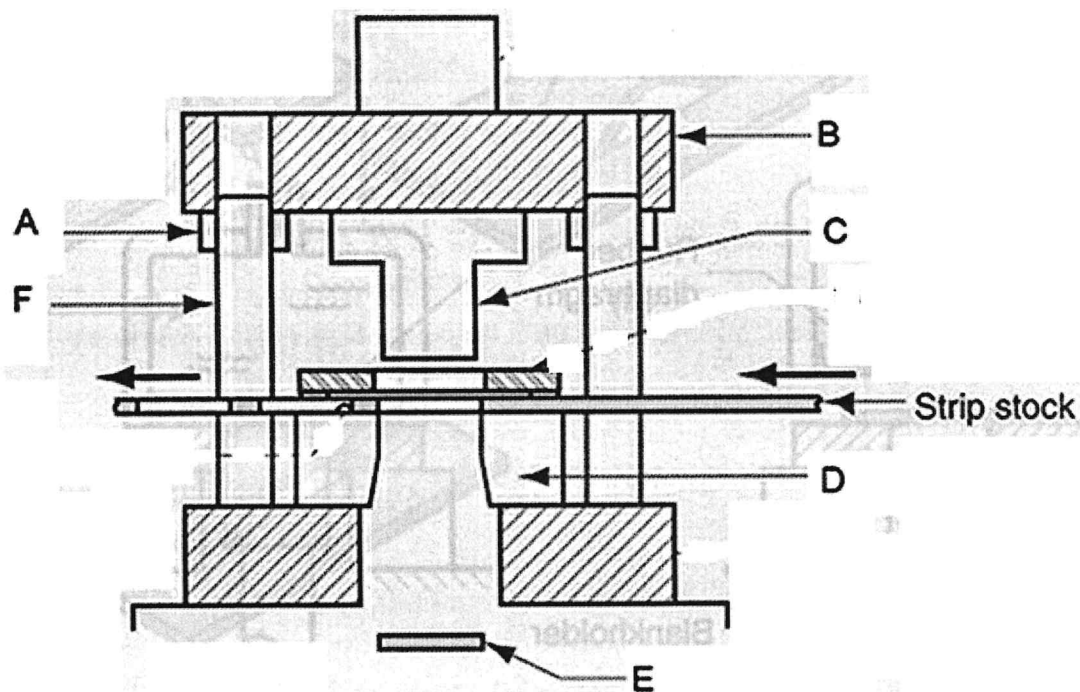


Fig. Q1(c)

