

BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF SCIENCE AND ENGINEERING

AEH 107

Department of Engineering and Physics

Bachelor of Science (Honours) Degree in Agricultural Engineering

Workshop Processes and Practices

3 hours (100 Marks)

Instructions:

- i. Answer **Four (4)** questions, each question carries 25 marks.
- ii. Begin a new question on a fresh page.

QUESTION 1

- a) With the aid of practical examples, explain human factors and environmental conditions in an engineering workshop. [7]
- b) Briefly describe, giving practical examples, four principles of accident control. [8]
- c) Discuss any five benefits that are achieved by accident prevention. [10]

QUESTION 2

- a) Briefly describe what you understand by marking out. [3]
- b) Draw a well labeled micrometer screw gauge. [7]
- c) Briefly describe the principle of a 0.02 mm vernier caliper. [5]
- d) With the aid of sketches, describe the following set of a hacksaw blade:
 - i. Raker, [3]
 - ii. Wavy and [3]
 - iii. Staggered set. [4]

QUESTION 3

- a) State and explain five factors that affect the strength of a welded joint. [10]
- b) Outline the procedure of starting up and shutting down an oxyacetylene set. [6]
- c) With the aid of sketches, briefly describe the three types of flames that are produced in gas welding and state one application of each. [9]

QUESTION 4

- a) Explain the reason of overbending material during a bending operation. [5]
- b) Explain the circumstances that would make it more appropriate to use a folding machine rather than a vice when bending sheet metal. [5]
- c) Explain the need to calculate the developed length of sheet metal components using the mean line. [5]
- d) Calculate the developed length of a right angle bracket made from a 2 mm thick sheet with a 3 mm corner radius, and has leg lengths of 90 mm and 50 mm. [5]
- e) Describe the deep drawing process. [5]

QUESTION 5

- a) Draw a single point tool and name all the angles. [10]
- b) With the aid of sketches, briefly describe any three taper turning methods. [15]

QUESTION 6

- a) Differentiate between the end mill and a slot drill cutter. [4]
- b) Calculate the dividing head settings if the supplied index plate has 21; 23; 27; 29; 31 and 33 holes for a work piece which is required to have:
 - i. 12 divisions, [3]
 - ii. A number of slots 38° apart. [3]

c) With the aid of diagrams explain the following milling techniques:

i. Up cut milling and

[5]

ii. Down cut milling.

[5]

d) Outline the five elements that one would consider when choosing horizontal milling cutters.

[5]