



**UNIVERSITY OF SWAZILAND
SUPPLEMENTARY EXAMINATION PAPER**

COURSE CODE: LUM 301

TITLE OF PAPER: - FARM MACHINERY

DIPLOMA IN AGRICULTURE YEAR 3

DIPLOMA IN AGRICULTURAL EDUCATION YEAR 3

TIME ALLOWED: TWO (2) HOURS

**SPECIAL MATERIAL REQUIRED: CALCULATOR &
PSYCHROMETRIC
CHART**

**INSTRUCTIONS: ANSWER QUESTION ONE AND ANY TWO
OTHER QUESTIONS.**

**DO NOT OPEN THIS PAPER UNTIL PERMISSION HAS BEEN
GRANTED BY THE CHIEF INVIGILATOR**

SECTION ONE: COMPULSORY

QUESTION ONE

- (a) Explain the situation under which a disc plough becomes the best choice primary tillage implement. (5 Marks)
- (b) What do you understand by disc and tilt angles as they apply in disc ploughs? How is depth of ploughing affected by these angles? (5 Marks)
- (c) A tractor travels at 6 km/h spreading fertilizer over a swath of 10 metres using a spinning disc fertilizer spreader. If the amount of fertilizer recommended per hectare is 400 kg; how much fertilizer must be delivered by the spreader per minute? (5 Marks)
- (d) A farmer has 50 hectares to be planted under maize. He has been advised by the soil testing laboratory to apply a compound fertilizer at a rate of 300 kg/ha. He intends to use a 10-row maize planter with fertilizer application units. The diameter of the planter press wheel is 0.80m. The row spacing for maize is 0.90 m
- (i) How many 50 kg bags of fertilizer will the farmer need for the maize? (5 Marks)
- (ii) How much fertilizer should be applied in 50 planter wheel turns? (*assume there is no wheel slip*) (5 Marks)
- (f) Determine the nozzle flow rate for a tractor-mounted boom sprayer with nozzles spaced at 900 mm if the travelling speed is 1.8 m/s and the desired application rate is 215- litres per hectare (10 Marks)
- (g) State two (2) advantages and two (2) disadvantages of conservation tillage (5 Marks)

SECTION II: ANSWER ANY TWO QUESTIONS

QUESTION TWO

- (a) Precisely give a description of how a wheat combine harvester functions? (10 Marks)
- (b) What are the possible reasons for getting un-threshed material from the combine harvester? (5 Marks)
- (c) List and explain the steps taken when hitching a full-mounted implement on a tractor. (10 Marks)
- (d) What are the effects of improper implement hitching? (5 Marks)

QUESTION TWO

- (a) In a maize drying experiment, ambient air at 30°C (Td.b.) and 22°C (Tw.b.) is blown by a fan into a heating unit. The temperature of the air is raised to 50°C. The hot air then passes through the grain picking up moisture and goes out fully saturated. Using the psychrometric chart provided, determine:
 - (i) The amount of heat energy in the ambient air. (5 Marks)
 - (ii) The amount of heat energy in the heated air (5 Marks)
 - (iii) The amount of moisture in the ambient air. (5 Marks)
 - (iv) The amount of moisture in the outgoing air (5 Marks)
- (b) (i) Name four (4) major components of a boom sprayer. (4 Marks)
(ii) Under what condition would you choose to use a duster instead of a sprayer? (1 Mark)
- (c) Discuss the pros and cons of the seed broadcasting method. (5 Marks)

QUESTION THREE

- (a) Calibration is an important task in agricultural equipment. Briefly explain what calibration is and its importance. (10 Marks)
- (b) (i) Name the implement shown in Figure 1 below? (2 Marks)
(ii) How is the implement hitched on a tractor? (3 Marks)
(iii) Name the components indicated in Figure 1 and state the function of each of them. (10 Marks)

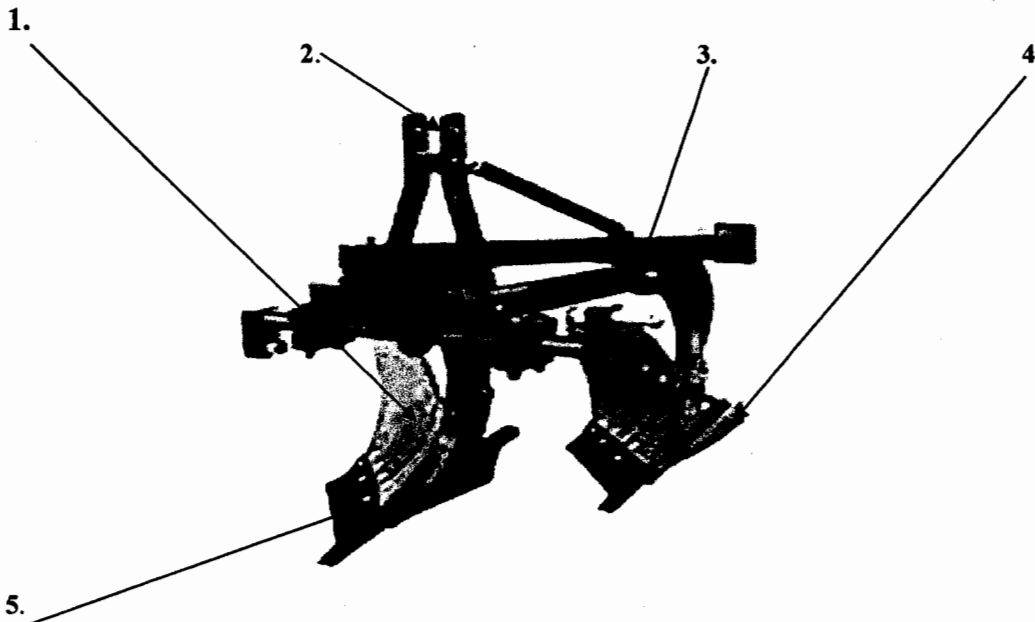


Figure 1.

- (c) State the common adjustments made on a disc plough. (5Marks)

QUESTION FOUR

- (a) Name five (5) categories under which farm equipment and implements are classified. Give two examples in each category. (15 Marks).
- (b) Discuss the following objectives of tillage:
i. Management of crop residue
ii. Improvement of soil tilth and seed placement (15 Marks).

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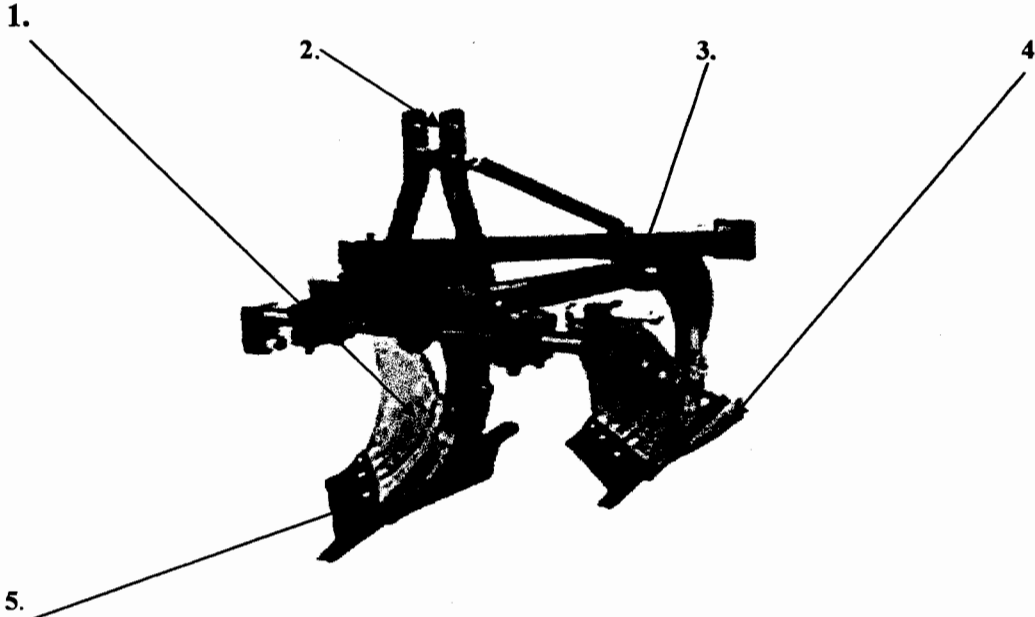
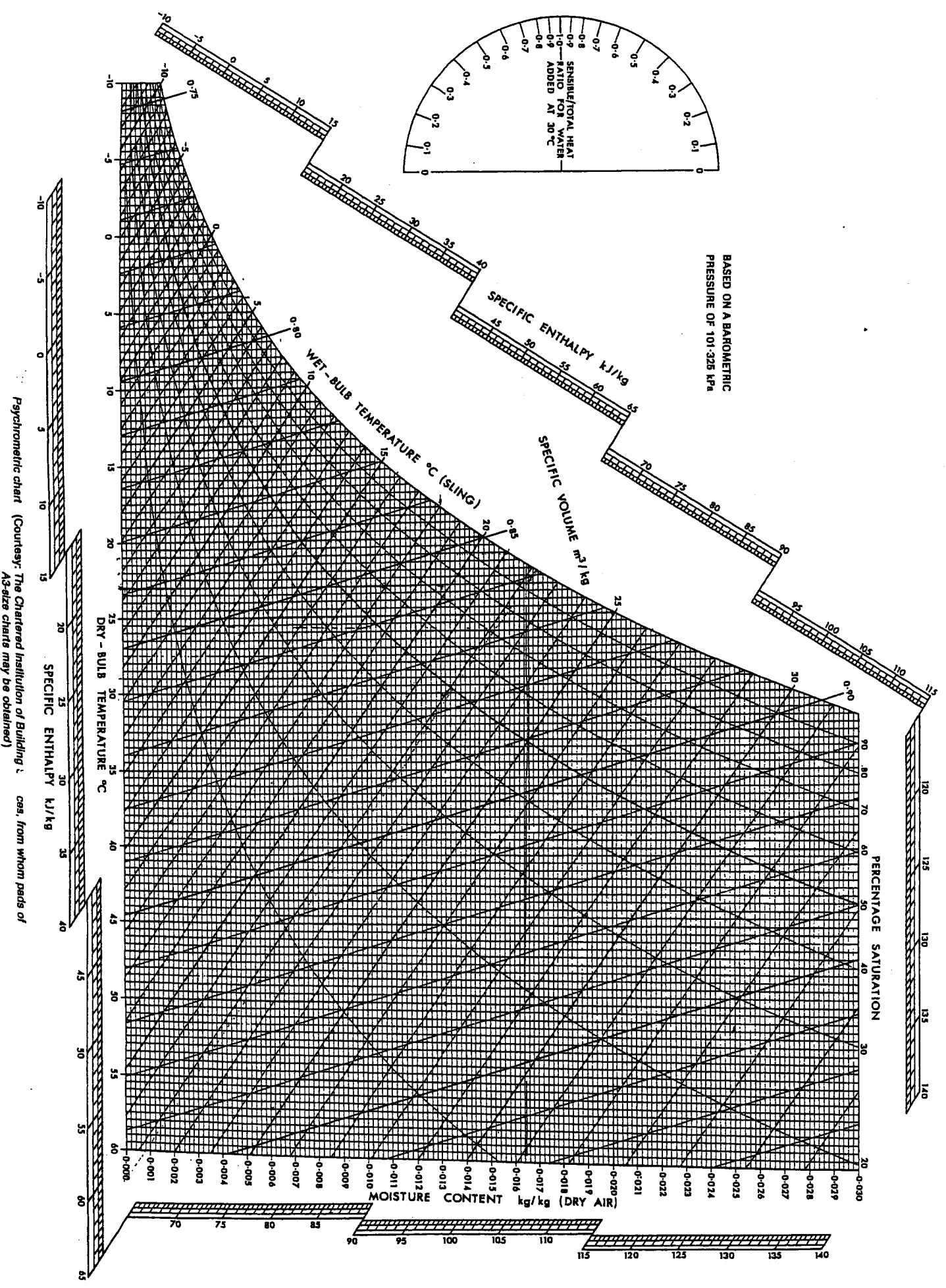


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Psychrometric chart (Courtesy: The Chartered Institution of Building Engineers, from whom parts of AS-size charts may be obtained)