

**2<sup>nd</sup> SEM.2012/2013**



**UNIVERSITY OF SWAZILAND  
MAIN EXAMINATION PAPER**

**PROGRAMME: BSC AGRIC. ECON. & AG. BMgt (2)**

**COURSE CODE: ABE 208**

**TITLE OF PAPER: POST-HARVEST TECHNOLOGY**

**TIME ALLOWED: TWO (2) HOURS**

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

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

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SECTION ONE: COMPULSORY

QUESTION ONE

- (a) Define psychrometry. Briefly describe **FIVE** psychrometric properties of major interest in crop post-harvest handling. **(12 Marks)**
- (b) If the dry and wet bulb temperatures of moist air are 35 °C and 26 °C respectively, determine the other thermodynamic properties of air from the psychrometric chart provided. **(10 Marks)**
- (c) Grain moisture content is expressed either on wet or dry basis. If a farmer reports that his grain consignment is at a dry basis moisture content of 18 %, what will be the moisture content on wet basis? **(10 marks)**
- (d) You are assigned to design a cylindrical sheet metal silo with capacity to store 20 tonnes of maize. Given that the bulk density of maize is 745 kg/m<sup>3</sup> and the diameter of the silo must be 1.5 m; Calculate
- i. the height of the silo **(4 Marks)**
  - ii. the quantity (m<sup>2</sup>) of sheet metal required to manufacture the silo **(4 Marks)**

***[Show all your working steps in the calculations]***

**SECTION II: ANSWER ANY TWO QUESTIONS**

**QUESTION TWO**

(a) Distinguish between the following:

- (i) Equilibrium moisture content and critical moisture content;
- (ii) Physiological maturity and horticultural maturity
- (iii) Drying and dehydration;
- (iv) Specific volume and bulk density of air ;
- (v) Relative humidity and absolute humidity.

**(15 Marks)**

(b) With the aid of a sketch diagram, discuss the critical parameters observed in the construction of a maize crib? **(15 marks)**

**QUESTION THREE**

(a) Discuss the desired characteristics of grain protectants that are used to prevent produce losses while in storage. **(10 marks)**

(b) Briefly discuss why the following conditions are important in grain handling:

- i. Loading grain into the silo early in the morning or late in the evening,
- ii. Adequately drying grain before storage,
- iii. Thoroughly cleaning the grain silo before storing new grain,
- iv. Storing grain under cool conditions,
- v. Placing the weevil tablet on the surface rather than inside the grain bulk.

**(10 Marks)**

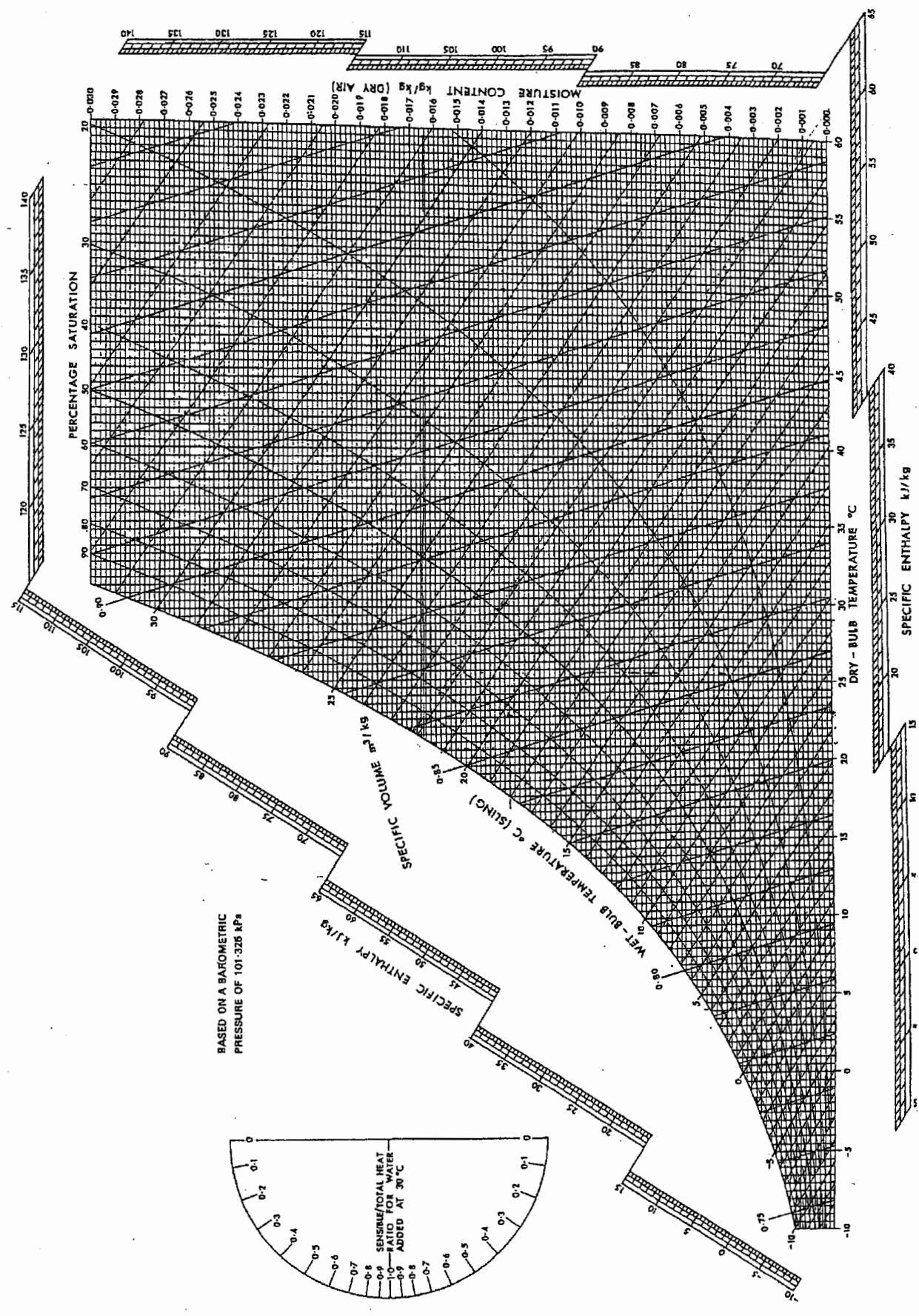
(b) Briefly discuss the effect of drying on grain quality. **(10 Marks)**

**QUESTION FOUR**

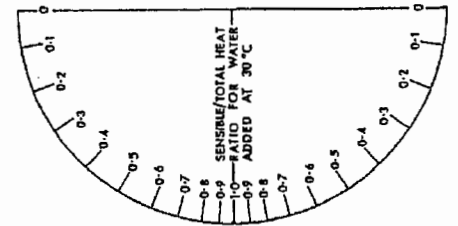
(a) Giving examples of the most important species, describe how micro-organisms cause losses in food grain. **(10 Marks)**

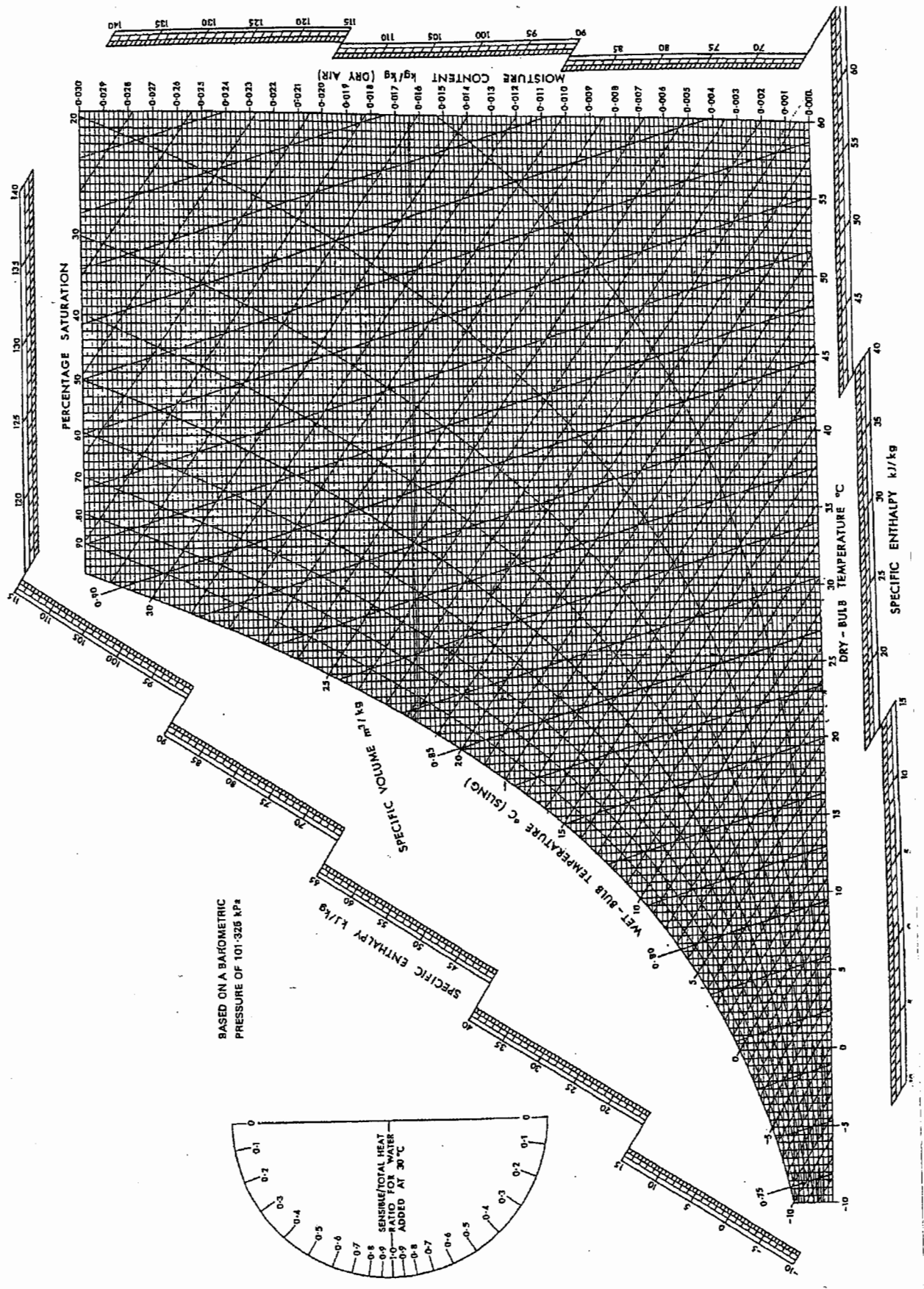
(b) Define sun drying and discuss the advantages and disadvantages of this method **(10 Marks)**

(c) Discuss the salt method for estimating grain moisture content. **(10 Marks)**



BASED ON A BAROMETRIC  
 PRESSURE OF 101.325 kPa





BASED ON A BAROMETRIC  
 PRESSURE OF 101.325 kPa

SENSIBLE/TOTAL HEAT  
 RATIO FOR WATER  
 ADDED AT 30°C