

2nd SEM.2013/2014.



**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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GRANTED BY THE CHIEF INVIGILATOR**

SECTION ONE: COMPULSORY

QUESTION ONE

- (a) Distinguish between the following terms as they are used in post-harvest technology:
- (i) Equilibrium moisture content and critical moisture content,
 - (ii) Physiological maturity and horticultural maturity,
 - (iii) Threshing and dehulling,
 - (iv) Absolute humidity and relative humidity,
 - (v) Enthalpy and entropy (10 Marks)
- (b) Discuss the desired characteristics of grain protectants that are used to prevent produce losses while in storage. (10 Marks)
- (c) Give a description of the oven method for estimating grain moisture content. (10 Marks)
- (d) Table 1 below is an extract from the records made by a student during a grain moisture determination practical using the oven method.

Table 1: Grain moisture determination practical records

Mass of empty heat resistant Petri dish + lid	M1	5.60 g
Mass of Petri dish + lid + wet grain	M2	65.78 g
Mass of Petri dish + lid + dry grain	M3	55.85 g

- (i) Show the formula (using the mass symbols M1, M2 and M3) that you would use to determine the grain moisture content (wet basis). (2½ Marks)
- (ii) Calculate the grain moisture content (wet basis) using the figures provided. Express your answer to 1 decimal place. (2½ Marks)
- (iii) Show the formula (using the mass symbols M1, M2 and M3) that you would use to determine the grain moisture content (dry basis). (2½ Marks)
- (iv) Calculate the grain moisture content (dry basis) using the figures provided. Express your answer to 1 decimal place. (2 ½ Marks)

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SECTION II: ANSWER ANY TWO QUESTIONS

QUESTION TWO

- (a) Define the following psychrometric properties:
- (i) Dew point temperature
 - (ii) Absolute humidity
 - (iii) Specific volume
 - (iv) Enthalpy
 - (v) Relative humidity
- (10 Marks)**
- (b) If the dry and wet bulb temperatures of moist air are 35°C and 26°C respectively, determine the following thermodynamic properties of the air from the psychrometric chart provided:
- (i) Dew point temperature,
 - (ii) Absolute humidity,
 - (iii) Specific volume,
 - (iv) Enthalpy,
 - (v) Relative humidity
- (10 Marks)**
- (c) Write short notes on complete insect metamorphosis indicating the stages that cause most damage to the grain
- (10 Marks)**

QUESTION THREE

- (a) Giving examples of the most important species, describe how moulds cause losses in food grain. **(10 Marks)**
- (b) Define sun drying and discuss the advantages and disadvantages of this method **(10 Marks)**
- (c) With the aid of a neat sketch diagram show the physical structure of a maize grain and briefly describe the composition of each of the components. **(10 Marks)**

QUESTION FOUR

(a) Discuss the best grain quality maintenance practices that should be adhered to at each of the following unit operations:

- (i) Harvesting,
- (ii) Transport,
- (iii) Drying,
- (iv) Shelling/threshing,
- (v) Storage.

(20 Marks)

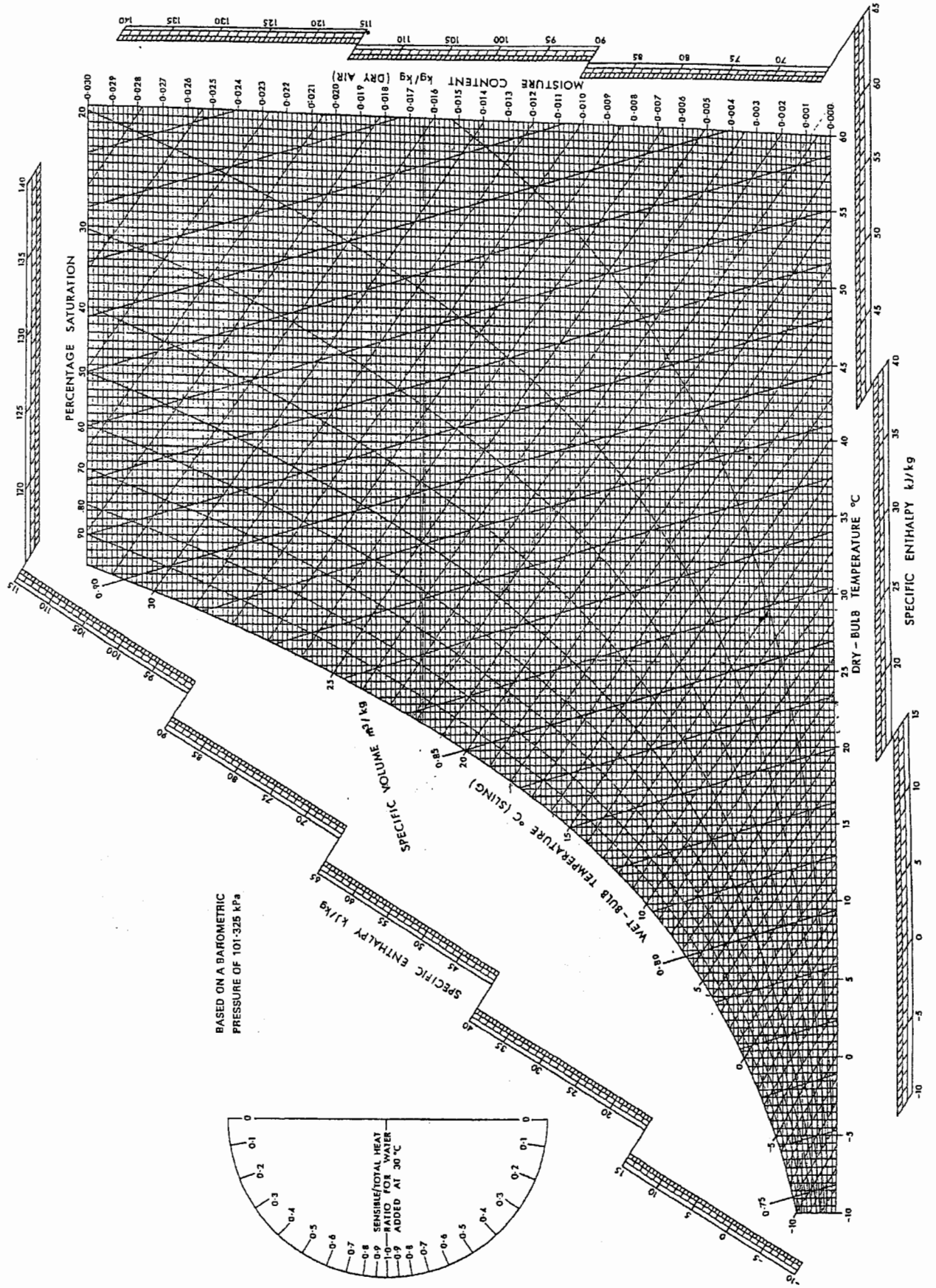
(b) Discuss the design features of a grain storage structure for hot and humid environments.

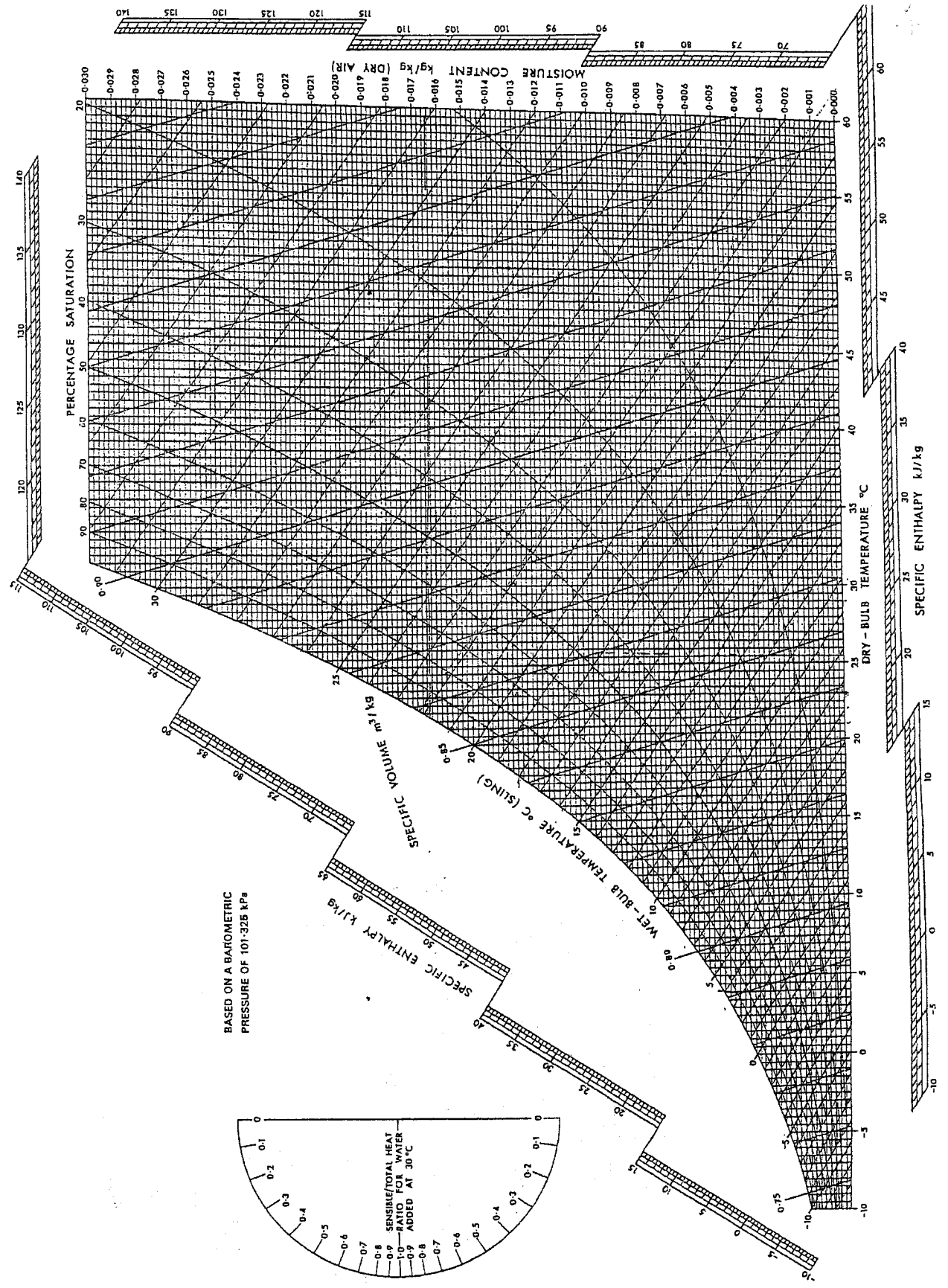
(10 Marks)

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Modern crop production techniques such as use of hybrid seeds, application of chemical fertilisers, herbicides, improved tillage techniques, irrigation technology, pest and disease control etc, have contributed tremendously to higher crop yields. Whilst this is an acceptable development in terms of food security, these modern systems have brought with them a lot of challenges. Outline post-harvest related challenges that are faced by farmers who have adopted the new technologies. **(10 Marks)**





BASED ON A BAROMETRIC
 PRESSURE OF 101.325 kPa

SENSIBLE HEAT
 RATIO FOR WATER
 ADDED AT 30°C