



**UNIVERSITY OF SWAZILAND  
FINAL EXAMINATION PAPER**

**PROGRAMME: ABE (4)**

**COURSE CODE: ABE 406**

**TITLE OF PAPER: CROP PROCESSING AND STORAGE**

**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****QUESTION ONE**

- a) Name the three main classifications of grain drying methods giving two examples in each case. (12 marks)
- b) Explain why drying grain is considered a loss to a farmer. (6 marks)
- c) i) Calculate the moisture shrink when drying peanuts from 15 percent to 10 percent moisture content (6 marks)
- ii) If a farmer has harvested 100 tonnes of peanuts at 15 percent moisture, what would be the weight after drying to 10 percent moisture. (6 marks)
- d) Modern crop production techniques such as use of hybrid seeds, application of chemical fertilizers, herbicides, improved tillage techniques, irrigation technology, pest and diseases 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 challenges that are faced by farmers who have adopted the new technologies. (10 marks)

**SECTION II: ANSWER ANY TWO QUESTIONS****QUESTION TWO**

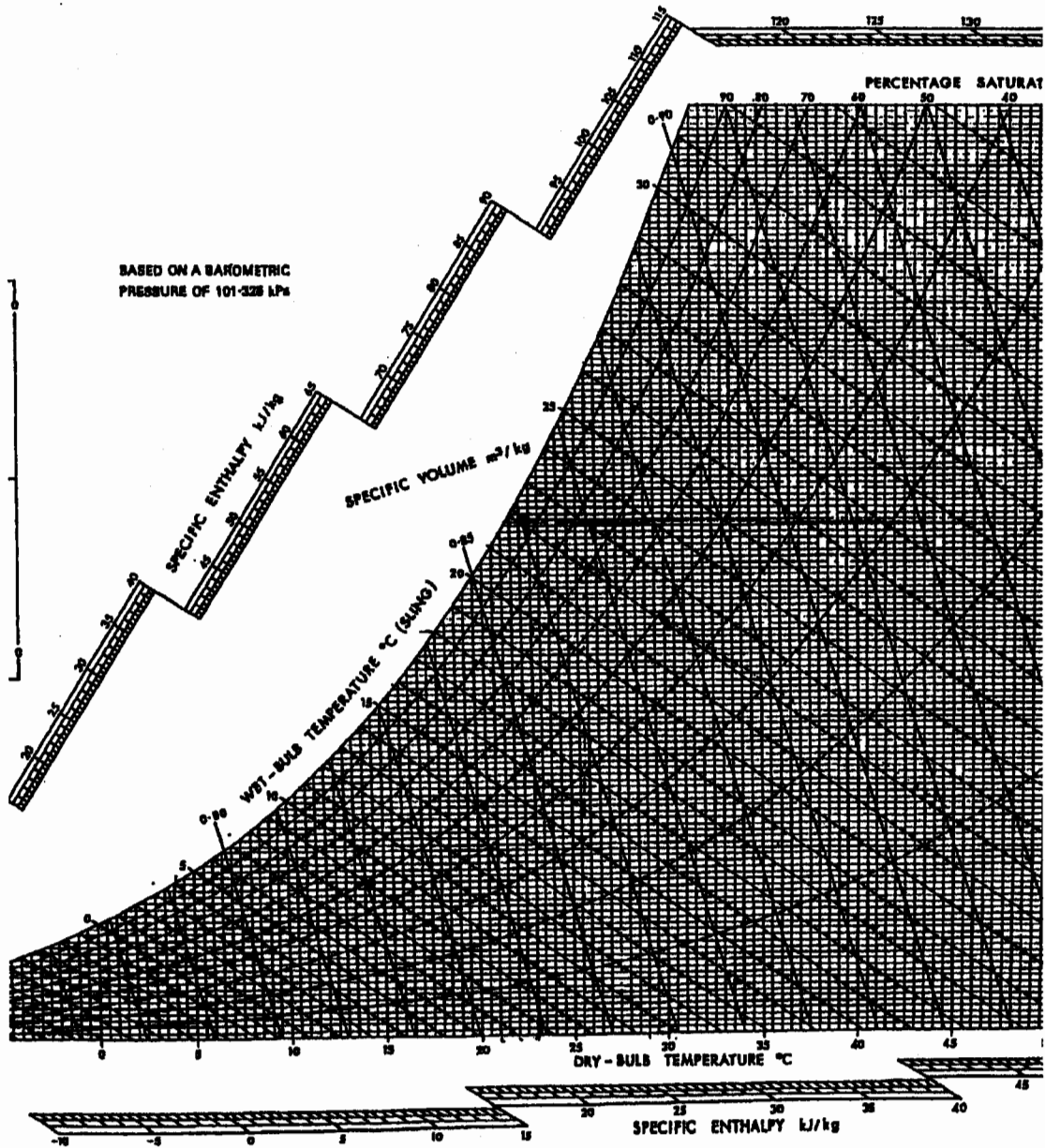
- a) With the aid of neat schematic representations, explain the principle of operation of a the following artificial dryers;
- i) Cross flow (5 marks)
- ii) Counter flow (5 marks)
- iii) Concurrent flow (5 marks)
- iv) Mixed flow (5 marks)
- b) Two samples of air both have a Relative Humidity of 50%. The temperature dry bulb of one is 32 °C and the other is 38 °C.
- i) How much moisture does each air sample contain? (5 marks)
- ii) How much energy does each air sample contain? (5 marks)

**QUESTION THREE**

- a) A farmers harvest 10 tonnes of maize at a moisture content of 18 % and stores it in an open storage for three weeks. When shelling the maize he realized that he had only 8.5 tonnes left. At what moisture content was the maize at shelling. (10 marks)
- b) State four (4) main devices used in conveying agricultural materials over short distances. (5 marks)
- c) In most agricultural processing industries, electric motors are predominately used. Why are they mostly used? (5 marks)
- d) Discuss two methods of determining the moisture content of grain, in particularly maize? (10 marks)

**QUESTION FOUR**

- a) With the aid of a clearly drawn and labelled diagram, show the relationship between seed moisture content and relative humidity when kept in storage. (10 marks)
- b) Moisture content of grain is usually determined on a wet basis  $MC_{wb}$  (%). Scientist sometimes use the dry basis  $MC_{db}$  (%).
- i) Write the expressions for the two equations, clearly naming the parameters. (10 marks)
- ii) Given that the moisture content on a dry basis is 8 %, calculate the moisture content on a wet basis. (10 marks)



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