



**1<sup>ST</sup> SEM. 2013/14**

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**UNIVERSITY OF SWAZILAND  
SUPPLEMENTARY EXAMINATION PAPER**

**PROGRAM : BACHELOR OF SCIENCE IN FOOD  
SCIENCE, NUTRITION AND TECHNOLOGY  
YEAR III**

**COURSE CODE : FSNT 302**

**TITLE OF PAPER : FOOD MACHINERY AND PLANT DESIGN**

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

**INSTRUCTIONS : ANSWER QUESTION ONE (1) AND ANY  
OTHER TWO (2) QUESTIONS. ILLUSTRATE  
YOUR ANSWERS WITH DIAGRAMS  
WHERE NEEDED**

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

**QUESTION 1 (COMPULSORY)**

- (a) Describe how a freeze drying system works (use sketch). (15 Marks)
- (b) Discuss the mechanical and operational requirements of food processing machinery. (15 Marks)
- (c) Discuss the importance of a relationship chart in laying out a food processing area. (10 Marks)

[TOTAL MARKS = 40]

**QUESTION 2**

- (a) Describe the changes taking place to the product in the different sections of an extrusion cooker. (15 Marks)
- (b) Discuss the principle of separation using membranes and describe the different classes of membranes. (15 Marks)

[TOTAL MARKS = 30]

**QUESTION 3**

- (a) Explain the following:
  - i. Fludization
  - ii. Rising film evaporator
  - iii. Heat integration
  - iv. Auxiliary system(4 x 5 = 20 Marks)
- (b) Describe the different types of displacement pumps used in the food industry. (10 Marks)

[TOTAL MARKS = 30]

**QUESTION 4**

- (a) Discuss the hygienic design for auxiliary systems (tanks and valves). (20 Marks)
- (b) Describe the working principle of a hammer and a disc mill. (10 Marks)

[TOTAL MARKS = 30]