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2ND SEMESTER 2011/2012

UNIVERSITY OF SWAZILAND

FINAL EXAMINATION PAPER

PROGRAM	:	**BACHELOR OF SCIENCE IN FOOD SCIENCE, NUTRITION AND TECHNOLOGY YEAR III**
COURSE CODE	:	**FSNT 410**
TITLE OF PAPER	:	**PROCESS CONTROL AND AUTOMATION**
TIME ALLOWED	:	**TWO HOURS**
INSTRUCTIONS	:	**ANSWER QUESTION ONE (1) AND ANY OTHER TWO (2) QUESTIONS. ILLUSTRATE YOUR ANSWERS WITH DIAGRAMS WHERE NEEDED**

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QUESTION 1 [COMPULSORY]

a. In juice concentration process using evaporator, steam flowing through a pipe regulated by a valve is used as the heat source. The control objective is to secure the correct temperature of the concentrated juice. With the help of a sketch (block diagram) describe how control is achieved by automatic feedback closed-loop control structure. (12 Marks)
b. Outline the automation strategies that can be employed to improve the productivity in manufacturing operations technology. (10 Marks)
c. Describe the physical elements of a control system. (8 Marks)
d. Explain the difference between discontinuous and continuous control. (4 Marks)
e. Describe the difference between feedback and feed-forward control loop structures. (6 Marks)

[TOTAL MARKS = 40]

QUESTION 2

a. Describe level measurement methods and give an example on the application of level measurement in the food industry. (10 Marks)
b. Describe the function of an actuator and give a brief explanation on the different actuator types. (6 Marks)
c. Give a brief explanation on the working principle of electronic noses. (6 Marks)
d. Describe the factors to be considered while selecting a transducer. (8 Marks)

[TOTAL MARKS = 30]

QUESTION 3

a. Describe flow measurement methods and give application of flow measurement in the food industry. (8 Marks)
b. Explain the working principle of a thermocouple and a resistance temperature detector (RTD). (8 Marks)
c. Give a brief explanation on the working principle of electronic tounges. (6Marks)
d. Describe the role of the final control element in a control system and give a practical example of such an element in food processing operation. (8 Marks)

[TOTAL MARKS = 30]

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QUESTION 4

a. Describe temperature measurement methods and give application of temperature measurement in the food industry. (8 Marks)
b. Explain the principle of a capacitive transducer and give an example of its application in the food industry. (7 Marks)
c. Give a brief explanation on the working principle of meat freshness tester. (7 Marks)
d. Explain the role of timers and indicator and give an example in food processing industry. (8 Marks)

[TOTAL MARKS = 30]