



2<sup>ND</sup> SEM. 2012/13

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FSNT 410 (S)

**UNIVERSITY OF SWAZILAND**  
**SUPPLEMENTARY EXAMINATION PAPER**

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

**COURSE CODE** : **FSNT 410**

**TITLE OF PAPER** : **PROCESS CONTROL AND AUTOMATION**

**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) Explain feedback and feed-forward control loop strategies. (15 Marks)
- (b) Outline the objectives of process control. (10 Marks)
- (c) Explain “on-off” and “On-off control action with differential gap” control systems. (15 Marks)

[TOTAL MARKS = 40]

**QUESTION 2**

- (a) Explain the following: (15 Marks)
  - i. Self generating transducers
  - ii. Manipulated variables
  - iii. Signal Filtration
  - iv. Strain gauges
  - v. Thermocouples
- (b) Outline five (5) purposes of automation. (10 Marks)
- (c) Describe the function of an actuator and give a brief explanation on the different actuator types. (5 Marks)

[TOTAL MARKS = 30]

**QUESTION 3**

- (a) Mention five (5) criteria to be considered when selecting transducers based on handling. (10 Marks)
- (b) With the help of sketches, describe the different types of control valves. (10 Marks)
- (c) Mention the types of control tuning and outline the purpose of control loop tuning. (10 Marks)

[TOTAL MARKS = 30]

**QUESTION 4**

- (a) Explain programmable automation and outline the features that characterise it. (10 Marks)
- (b) When applying infra-red thermometers, what are the issues that must always be considered? (20 Marks)

[TOTAL MARKS = 30]