CHUKA UNIVERSITY

UNIVERSITY EXAMINATIONS

SECOND YEAR EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN FOOD SCIENCE & TECHNOLOGY

FOST 233: FOOD PROCESS INSTRUMENTATION

STREAMS: BSc, FOOD SCIENCE & TECH Y2S1 **TIME: 2 HOURS**

DAY/DATE: WEDNESDAY 5/12/2018 **8.30 A.M - 10.30 A.M.**

INSTRUCTIONS:

- **Answer ALL Questions**
- **Do not write anything on the question paper**
- **Switch off your mobile phones**

1. (a) Define an instrument with regard to instrumentation. [2 Marks]

(b) Distinguish between the following terms as used in measuring instruments;

(i) Accuracy and precision [2 Marks]

(ii) Actuator and controller [2 Marks]

(iii) Transducer and converter [2 Marks]

(c) Accuracy and precision of a measuring instrument are affected by error signals. Show your understanding of these errors by defining what an error signal is and also give two examples of such errors and their causes. [7 Marks]

2. The high temperature short time pasteurization systems uses raw milk float valve, steam heated water with a pneumatic steam valve and flow diversion valve. Using a diagram illustrate the temperature control for the system so as to ensure that the pasteurized milk attained a temperature of 72^{o}C/15 sec. [20 Marks]

3. Explain how the following devices are applied in instrumentation:

(i) A bimetallic strip [3 Marks]

(ii) Bourdon tube [3 Marks]

(iii) A thermocouple [3 Marks]

4. A steam generation system consists of a steam boiler with a feed-water control system, combustion control system, steam trap and steam distribution system with pressure reducers, safety valves and condensate removal devices. Using a diagram, illustrate and discuss the instrumentation control for the steam generation system. [20 Marks]

5. Illustrate how a 48 segment 24 hours per turn timer works. [6 Marks]

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