

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

RESIT/SPECIAL

EXAMINATIONS FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN
FOOD SCIENCE AND TECHNOLOGY

FOST 131: FUNDAMENTALS OF FOOD PROCESS ENGINEERING I

STREAMS: BSC (FOST) Y1S2

TIME: 2 HOURS

DAY/DATE: TUESDAY 02/02/2021

8.30 A.M. – 10.30 A.M.

INSTRUCTIONS: Answer ALL Questions in section A and ANY other TWO Questions in section B

SECTION A

1. i) Use a clearly labeled diagram to explain the terms; system, boundary and surroundings. (5 marks)
- ii) Define Viscosity. (2 marks)
2. Distinguish between an adiabatic system and an isothermal system. (2 marks)
3. A tubular water blancher is being used to process Lima beans. The product mass flow rate is 860 kg/h. It is found that the theoretical energy consumed for the blanching process amounts to 1.19 GJ/h. The energy lost due to lack of insulation around the blancher is estimated to be 0.24 GJ/h. If the total energy input to the blancher is 2.71 GJ/h,
 - i.) Calculate the energy required to reheat water. (5 marks)
 - ii.) Determine the percent energy associated with each stream. (3 marks)
4. (i) Enumerate advantages offered by Plate heat exchangers. (5 marks)
- (ii) Differentiate between Steady-state and unsteady-state heat transfer conditions. (2 marks)
5. Name and use a diagram(s) to illustrate three types of liquid flow characteristics. (6 marks)

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SECTION B

6. a) State and explain the second law of thermodynamics. Give examples. (10 marks)
- b) Use a diagram of shear stress vs shear rate to illustrate how different liquids behave under increased shear stress. Explain. (10 marks)
7. Discuss the following modes of heat transfer;
- (i) Conductive Heat Transfer (8 marks)
- (ii) Convective Heat Transfer (7 marks)
- (iii) Radiation Heat Transfer (5 marks)
8. There are numerous types of pumps used in the food industry. Classify them and explain variations within each of these types. (20 marks)
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