



*(Knowledge for Development)*

**KIBABII UNIVERSITY**  
**UNIVERSITY EXAMINATIONS**  
**2017/2018 ACADEMIC YEAR**

**THIRD YEAR 1<sup>ST</sup> SEMESTER**  
**SPECIAL/SUPPLEMENTARY EXAMINATIONS**

**FOR THE DEGREE OF BACHELOR OF SCIENCE RENEWBLE  
ENERGY**

**COURSE CODE: IPT 331**

**COURSE TITLE: BIOPROCESS ENGINEERING**

**DATE: 5/10/2018**

**TIME: 11:30-1:30PM**

---

**INSTRUCTIONS TO CANDIDATES**

Answer Question one (1) and any other two (2) Questions. Question one is compulsory and carries 30 marks, the other Questions carry 20 marks each.

TIME: 2 Hours

This paper consists of 2 printed pages. Please Turn Over



KIBU observes ZERO tolerance to examination cheating

**Question 1**

- a) Why are microorganisms preferred to chemical process in product manufacturing? (3 Marks)
- b) What are the two major requirements for microbial growth? (2 Marks)
- c) What is the purpose of growing microorganisms under controlled conditions? (2 Marks)
- d) List the factors you would consider in the choice of a bioreactor? (4 Marks)
- e) What is mass transfer and which components are usually involved in a bioreactor? (4 Marks)

**Question 2**

- a) Explain the differences among Chemically Defined Medium, Minimal Medium and Complex Medium (15 Marks)
- b) Why is a chemostat difficult to operate? (5 Marks)

**Question 3**

Describe the classification of bioreactors (20 Marks)

**Question 4**

Describe the Growth requirements of Cells/microorganisms (20 Marks)

**Question 5**

Discuss the challenges of scale-up and scale-down of bioreactors (20 Marks)