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(Knowledge for Development)

KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS 2019/2020 ACADEMIC YEAR

THIRD YEAR FIRST SEMESTER SPECIAL/SUPPLEMENTARY EXAMINATIONS

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

COURSE CODE: IPT 331

COURSE TITLE: BIOPROCESS ENGINEERING

DATE: 03/02/2021

TIME: 11:00 - 1:00 PM

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) Enzymes are classified by the kind of chemical reaction catalyzed. List the four classes of enzymes under this classification(4 marks)
- b) State the four different phases of the Bacterial Growth Curve (4mark)
- c) Define Polymerase chain reaction? (2marks)
- d) Write the advantages of fed batch mode of fermentation(3marks)
- e) Define animal cell culture? (2marks)
- f) What are the applications of cell culture? (5marks)
- g) Give four 'expression systems' used in study of heterologous expression (4marks)
- h) Differentiate between DNA and RNA molecules(3marks)
- i) Give three requirements for a bioreactor for mammalian cell culture (3marks)

Question 2

State the major environmental factors that are controlled in a bioreactor and explain how each of them influences the design of a bioreactor (20 marks)

Question 3

Discuss mass transfer phenomenon in a bioreactor (20 marks)

Question 4

Describe the different types of bioreactors (20marks)

Question 5

Explain how Bioreactors are modeled (20marks)