KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS
2017/2018 ACADEMIC YEAR
SECOND YEAR FIRST SEMESTER
SPECIAL EXAMINATIONS

FOR THE DEGREE OF B.S.C

COURSE CODE: IET 231

COURSE TITLE: APPLIED BIOCHEMISTRY FOR-ENERGY

DURATION: 2 HOURS

DATE... **18/10/2018** **TIME: 8:00-10:00AM**

INSTRUCTIONS TO CANDIDATES

- Answer QUESTION ONE (Compulsory) and any other two (2) Questions.
- Indicate answered questions on the front cover.
- Start every question on a new page and make sure question's number is written on each page.

This paper consists of 3 printed pages. Please Turn Over

KIBU observes ZERO tolerance to examination cheating

Q1.

a) Define the following terms as used in applied biochemistry for bio-energy **(4mks)**

i. Syngas

ii. Greenhouse Gas

iii. Biomass

iv. Bagasse

b) Discuss four sustainable energies that can be alternative to energy derived from fossil fuels. **(8mks)**

c) Explain three generations of fuels from biomass **(6mks)**

d) Explain four benefits of anaerobic digestion of organic waste. **(8mks)**

e) Describe how you would carry out the following tests in the laboratory **(4mks)**

i. Benedict's test

ii. Clinistix paper test

Q2.

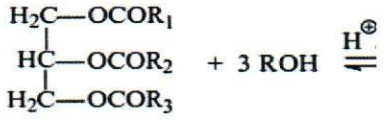
a) Describe three ways how biogas from anaerobic digester is industrially purified. **(6mks)**

i. De-carbonation

ii. Desulfurization

iii. Dehydration

b) Complete the equation below and show chemical mechanisms of transesterification reaction in presence of an acid. **(8mks)**



b) State two products of the above transesterification reaction **(2mks)**

c) Describe how the following are biodegraded in biofuel production **(6mks)**

i. Lignin

ii. Cellulose

iii. Hemicellulose

Q3.

a) Explain four types of biomass that are suitable for biofuels production **(8mks)**

b) Explain the following biochemical processes **(4mks)**

i. Ethanol fermentation

ii. lipid biosynthesis

c) Discuss four merits of using biodiesel instead of diesel fuel **(8mks)**

Q4.

a) State two types of energy crops **(2mks)**

b) Explain three reasons why different plants are preferred in biofuels production **(6mks)**

c) Calculate amount of ethanol that can be produced when 1000 kg of sugar is allowed to ferment given that specific gravity of ethanol at 25^0C is 0.789g/cm^3. **(6mks)**

d) Explain the following terms as used in applied biochemistry for bioenergy **(6mks)**

i. Phospholipids

ii. Glycolipids

iii. Lipoproteins

Q5.

a) Explain four reasons why it is important to carrying out pre-treatment on lignocellulose in biofuel production. **(8mks)**

b) Discuss the following pre-treatment processes that are carried out on lignocellulose in biofuel production **(8mks)**

i. Steam explosion
ii. Wet oxidation
iii. Alkaline hydrolysis
iv. Carbon dioxide explosion

c) Explain roles of the following enzymes in biofuel production **(4mks)**

i. Trichoderma cellulasses
ii. Peroxidases

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