INTERNATIONAL UNIVERSITY OF EAST AFRICA

'Learning to Succeed'

FACULTY OF ENGINEERING

END OF SEMESTER EXAMINATIONS - APRIL 2025

PROGRAMME: BACHELOR OF PETROLEUM ENGINEERING

YEAR/SEM: YEAR 1/SEMESTER 1

COURSE CODE: PTE1162

NAME: INTRODUCTION TO ENERGY TECHNOLOGY

DATE: 2025-04-15

TIME: 9:00AM-12:00PM

INSTRUCTIONS TO CANDIDATES:

1. Read the instructions very carefully
2. The time allowed for this examination is STRICTLY three hours
3. Read each question carefully before you attempt and allocate your time equally between all the Sections
4. Write clearly and legibly. Illegible handwriting cannot be marked
5. Number the questions you have attempted
6. Use of appropriate workplace examples to illustrate your answers will earn you bonus marks
7. Any examination malpractice detected will lead to automatic disqualification.

DO NOT WRITE ANYTHING ON THE QUESTION PAPER

Section A Answer any two questions

Question 1:

(a) Explain the term energy technology **[2 marks]**

(b) Briefly explain how knowledge obtained from energy technology can be applied in daily life **[6 marks]**

(c) Explain how energy can contribute to the social and economic development of any nation **[9 marks]**

(d) An ideal energy converter develops 500N-m of torque while running at 3600rpm. If the input voltage is 1200 volts, determine

(i) The input current for this generator. **[5 marks]**

(ii) Calculate the power output of the ideal converter **[3 marks]**

Question 2:

(a) With the help of examples, explain the differences between renewable and non-renewable sources of energy **[9 marks]**

(b) Explain the various issues and barriers which impede the large-scale implementation of renewable energy technologies. **[16 marks]**

Question 3:

(a) Discuss the strength and weaknesses of bio energy technology **[8 marks]**

(b) Discuss the different types of Coal as a source of energy **[8 marks]**

(c) Explain briefly how natural gas is formed **[9 marks]**

Question 4:

(a) Discuss the different forms of energy **[10 marks]**

(b) Explain the law of conservation of energy **[3 marks]**

(c) What are the key advantages and disadvantages of wind energy technology? **[6 marks]**

(d) What is meant by the term “stand-alone” and what is the key difference between the two different stand-alone systems you know. **[6 marks]**

Section B Answer any two questions

Question 1:

(a) Explain the importance of ozone layer **[8 marks]**

(b) Explain the term ozone depletion **[4 marks]**

(c) Discuss the causes of ozone depletion **[8 marks]**

(d) Discuss the harmful effects of ozone layer depletion. **[5 marks]**

Question 2:

(a) What is meant by the term acid rain? **[2 marks]**

(b) Explain the causes of acid rain. **[6 marks]**

(c) What effects do acid rain has to the environment? **[8 marks]**

(d) How can one control the reoccurrence of acid rain? **[5 marks]**

(e) Briefly explain the sources of nitrogen and phosphorous compounds found on water surfaces. **[4 marks]**

Question 3:

(a) Explain the following terms as they are used in energy technology

(i) Elasticity ratio of electricity production

(ii) Efficiency ratio of energy processing and conversion

(iii) Total domestic energy consumption **[3 marks each]**

(b) What are the four different PV technologies in use today? **[8 marks]**

(c) Differentiate between Horizontal Axis Wind Turbines (HAWTS) and Vertical Axis Wind Turbines (VAWTS), include the advantages and disadvantages of each in your explanation **[8 marks]**

Question 4:

(a) Explain the term greenhouse effect. **[4 marks]**

(b) Name 3 greenhouse gases and name their sources of origin. **[6 marks]**

(c) Greenhouse effect is regarded as a necessary evil explain **[5 marks]**

(d) What are the effects of excessive accumulation of greenhouse gases into the atmosphere? **[10 marks]**