



KIBABII UNIVERSITY

2017/2018 ACADEMIC YEAR

FOURTH YEAR SECOND SEMESTER

SPECIAL/SUPPLEMENTARY EXAMINATIONS

**FOR THE DEGREE OF BACHELOR OF SCIENCE IN RENEWABLE ENERGY AND
BIOFUELS TECHNOLOGY**

COURSE CODE: IET 425

COURSE TITLE: Energy Auditing

DATE: 4/10/2018

TIME: 11:30-1:30AM

INSTRUCTIONS TO CANDIDATES

Answer question ONE and any other two questions

This paper consists of 4 printed pages. Please Turn over

Question One

- (a) Briefly explain what is meant by 'plant energy performance' (PEP) **5 marks**
- (b) The Energy Act 2011 requires that all designated consumers should get energy audits conducted. State the person mandated to carry out this function **1 mark**
- (c) State the six key elements of an energy audit **6 marks**
- (d) Part of designing the audit plan is the identification of data sources. Many sources of existing data can be utilized, both within the organisation and external to it. State and explain any FIVE Kinds of data and their sources **5 marks**
- (e) Briefly explain why many government worldwide have made "energy audit" a statutory requirement **5 marks**
- (f) (i) Define Measurement and Verification **2 marks**
(ii) Explain the importance of "power factor" in electrical power consumption and billing **6 marks**

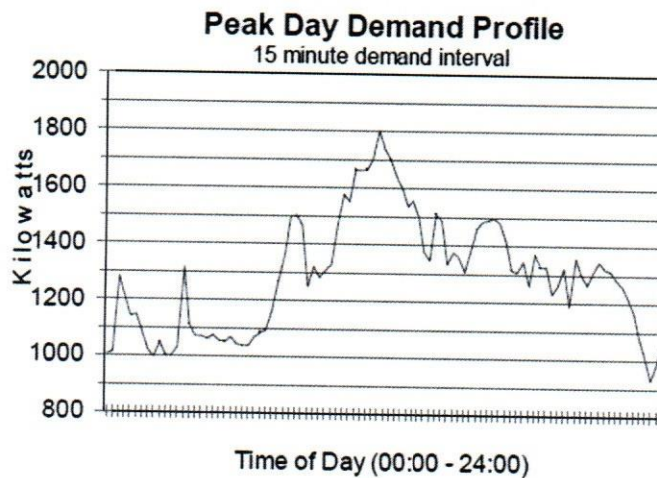
Question Two

- (a) Describe the base line data that an audit team should collect while conducting detailed energy audit **10 marks**
- (b) All energy consuming equipment and systems were designed to meet a specific need or set of needs. Finding energy savings opportunities involves reducing the level of energy use while still meeting the original need or requirement. Explain methods of achieving this. **10 marks**

Question Three

The figure below shows a demand profile. Explain the type of information that may be obtained from such a figure

20 Marks



Question Four

Name the instruments used for the following measurements:

(a)

5 marks

i) This instrument has in-built chemical cells which measure various gases such as O_2 , CO , NO_x and SO_x .

ii). Illumination levels are measured with this meter. It consists of a photo cell which senses the light output, converts to electrical impulses which are calibrated in terms of illumination levels

iii) These are thermocouples which measures flue gas, hot air, hot water temperatures by insertion of probe into the stream

iv) A hand bellows pump draws the flue gas sample into the solution inside the instrument. A chemical reaction changes the liquid volume revealing the amount of gas

v) This is a non-contact type measurement which when directed at a heat surface directly gives the temperature read out.

(b) State the demand profiling methods that can provide useful information to the electrical auditor.

5 marks

(c) State energy saving opportunities that may be obtained from demand profile

10 marks

Question Five

(a) Briefly explain with examples on fuel and energy substitution

10 marks

(b) Distinguish between 'preliminary energy audit' and 'detailed energy audit'

10 marks