



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

UNIVERSITY EXAMINATION FOR:

DEGREE BSME 05

EMG 2521: ENERGY MANGEMENT

END OF SEMESTER EXAMINATION

SERIES: DECEMBER2016

TIME: 2HOURS

DATE: Pick Date Dec2016

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **FIVE** questions. Attempt any **THREE** questions.

Do not write on the question paper.

Q1. a) Discuss energy use patterns in the following sectors

- i. Domestic
- ii. Transport
- iii. Industrial
- iv. Agriculture (8mks)

b) Define the following concepts as used in energy management (6mks)

- i. Energy conversion
- ii. Energy efficiency
- iii. Energy balance

c) Explain any **TWO** examples of Energy flow systems (2mks)

d) In a power plant, the steam from the boiler reaches the turbine at a temperature of 700 °C. The spent steam leaves the turbine at 100 °C. Calculate the maximum efficiency of the turbine (4mks)

Question Two

- a) Define the term Energy Audit (2mks)
- b) Give Two types of Energy audits that can be carried out in an industry (2mks)
- c) Explain the need for Firms to carry out Energy audits (3mks)
- d) Discuss the procedure for carrying out a detailed Energy Audit taking into consideration the following audit phases (9mks)
 1. Phase I - Pre Audit Phase
 2. Phase II - Audit Phase
 3. Phase III - Post Audit Phase
- e) After carrying a detailed Energy Audit give FOUR recommendations for energy saving opportunities (4mks)

Question Three

- a) Define the term Tariff as used in energy management (2mks)
- b) Explain Three important policy objectives involved in tariff setting (6mks)
- c) List FOUR characteristics of a good Tariff structure (4mks)
- d) Name THREE major types of electricity Tariffs categories used in Kenya (2mks)
- e) Discuss the costs involved when setting the Tariff structure (6mks)

Question Four

- a) Define the term power factor (2mks)
- b) Explain the causes of low power factor and Give TWO disadvantages of a low power factor (4mks)
- c) Define the term load factor and give THREE characteristics of loads (4mks)
- d) Explain THREE causes of load shedding and its effects on energy costs (5mks)
- e) Discuss THREE techniques of load shedding giving the drawbacks of each (5mks)

Question Five

Discuss Energy consumption and cost saving opportunities in the industrial sector taking into consideration the following systems: motors, lighting systems, heating systems, fans, pumps, fuel fired equipments, refrigeration and air conditioning system (20mks)