



**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY**

**UNIVERSITY EXAMINATIONS
2021/2022 ACADEMIC YEAR**

FOURTH YEAR SECOND SEMESTER MAIN EXAMINATIONS

**FOR THE DEGREE
OF
BACHELOR OF SCIENCE (PHYSICS)**

COURSE CODE: SPH 454

COURSE TITLE: ENERGY SYSTEMS AND MANAGEMENT

DATE: THURSDAY 21ST APRIL, 2022 TIME: 12:00 PM – 2:00 PM

INSTRUCTIONS TO CANDIDATES

TIME: 2 Hours

Answer question ONE and any TWO of the remaining

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 3 Printed Pages. Please Turn Over. ►

QUESTION ONE (30 MARKS)

- a) Outline the basic concept of energy giving considerations to the definition and the conservation law. (2 marks)
- b) Explain the advantages of a condenser in a steam power plant (3 marks)
- c) Outline the three sources of useful energy utilized by human beings on planet (3 marks)
- d) Outline the major skills in energy management. (4 marks)
- e) Discuss the three main classifications of thermal power plants emissions. (3 marks)
- f) Distinguish between run-off river plants and reservoir plants (2 marks)
- g) Discuss the term fuel as used in a nuclear reactor (2 marks)
- h) State the three major components of a gas turbine. (3 marks)
- i) State any four advantages of Automatic Meter Reading (AMR) (4 marks)
- j) Define energy management outlining its objectives. (4 marks)

QUESTION TWO (20 MARKS)

- a) Discuss the layout of a steam power plant outlining the components of the power plants with the main circuits of this power plant. (10 marks)
- b) Write the advantages of a diesel thermal power plant, basing on the construction, efficiency and working principle. (10 marks)

QUESTION THREE (20 MARKS)

- a) Discuss the seven key elements in energy management by discussing the steps involved. (7 marks)
- b) Discuss the major responsibilities of an energy manager and policy. (8 marks)
- c) State any five factors to consider when setting up a hydroelectric power plant. (5 marks)

QUESTION FOUR (20 MARKS)

- a) Discuss the following factors used in determination of energy consumption.
 - (i) Current efficiency (4 marks)
 - (ii) Decomposition potential (6 marks)
- b) Explain the relevance of wind power, outlining the major environmental impacts on its utilization. (10 marks)

QUESTION FIVE (20 MARKS)

- a) Discuss the pressurized (PWR) nuclear power reactor giving its layout and the advantages and disadvantages of the system. (10 marks)
- b) Discuss the global energy scenario, giving the percentage dominance for oil both for OPEC and non-OPEC countries. (5 marks)
- c) Distinguish between renewable and non-renewable energy resources indicating two examples for each. (5 marks)