



JARAMOGI OGINGA ODONGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF ENGINEERING AND TECHNOLOGY

**UNIVERSITY EXAMINATIONS FOR THE DEGREE IN SCIENCE IN RENEWABLE
ENERGY TECHNOLOGY AND MANAGENT**

3RD YEAR 1ST SEMESTER 2018/2019 ACADEMIC YEAR

CENTRE: MAIN CAMPUS

COURSE CODE: TET 3314

COURSE TITLE: STEAM PLANT ENGINE TECHNOLOGY

EXAM VENUE: STREAM: BSc REN ENERGY TECH & MGT

DATE: ../12/2018 EXAM SESSION:

DURATION: 2 HOURS

Instructions

- 1. Answer question 1 (Compulsory) and ANY other two questions**
- 2. Candidates are advised not to write on question paper**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room**

QUESTION ONE (COMPULSORY)

- a) Name and describe briefly five main types of vapour power cycles that are commonly used in steam power generation. (10 marks)
- b) List down the criterion for comparison of different power cycles. (2 marks)
- c) The efficiency of a power cycle is determined by the highest and lowest temperatures in the cycle, what factors limit these temperatures? (4 marks)
- d) Why do you think vapour is preferred as a working medium in a power plant? (2 marks)
- e) Calculate the heat and work transfers, cycle efficiency, work ratio and steam consumption of a power plant utility operating on a Rankine cycle using steam between pressures 30 and 0.04 bar. (12 marks)

QUESTION TWO

- a) Outline the requirements of vapours to be used in steam power plants. (5 marks)
- b) Outline the advantages of liquid fuels over solid fuels. (5 marks)
- c) Carnot cycle is an ideal cycle which gives maximum efficiency while operating on a selected temperature range. Clearly outline the major reasons why a Carnot cycle cannot be realised in practice. Draw the T-s diagram for the basic Rankine cycle and identify all the thermodynamic processes in the cycle. (10 Marks)

QUESTION THREE

- a) List two types of surface condensers. What are the advantages and disadvantages of a surface condenser as opposed to other condensers? (6 marks)
- b) State six (6) advantages of steam turbine over steam engine. (6 marks)
- c) Outline the various factors influencing boiler efficiency. (8 marks)

QUESTION FOUR

- a) What is a super heater and what are the advantages of using superheated steam? (4 marks)
- b) What are the requirements of a steam power plant? What design factors will you consider to meet the requirements of a steam power plant? (6 marks)
- c) Outline any four factors that are considered during the design of a furnace. (4 marks)
- d) Outline three advantages and three disadvantages of using a contact condenser in a vapour power plant. (6 marks)

QUESTION FIVE

- a) Mumias Sugar Company has realized that the cost of electricity in the company is too high and is considering reducing it. You have been offered consultancy services to advise the company on how to achieve this goal. What would you advice. (10 marks)
- b) As part of its strategic planning of Jaramogi Oginga Odinga University of Science and Technology, the management has decided to cut down on the cost of electricity and at the same time take care of frequent power blackouts. The centre for energy studies in the school of engineering and technology has been asked to make recommendations to the University on the most appropriate plant for this station. As a consultant with the centre for energy studies, what criterion would you consider in selecting a suitable plant for the power station? (10 marks)