



MURANG'A UNIVERSITY COLLEGE

(A Constituent College of Jomo Kenyatta University of Agriculture and Technology)

SCHOOL: ENGINEERING AND TECHNOLOGY

DEPARTMENT: ELECTRICAL AND ELECTRONICS ENGINEERING

LEVEL: DIPLOMA

CLASS: MRUC/EE/P/14DJ

YEAR: II

SEMESTER: II

JAN-APRIL: 2015

ACADEMIC YEAR: 2014/2015

UNIT: POWER SYSTEM I

UNIT CODE: SEE 1321

EXAM: MAIN

DATE: 21ST APRIL 2015

TIME: 2 HOURS

Instructions to candidates

This exam paper contains section `A` and `B` with five question in total.

Answer Question one (1) and any other two

You should have the following for this examination;

- Drawing instruments
- Scientific calculator
- No mobile phones allowed in the exam

SECTION `A` COMPULSORY

- Q.1 a)** (i). Outline any two sources of electrical energy. (2marks)
- (ii) Explain *three* main types of excitation systems applied to regulate the output of alternators. (3 marks)
- (iii) With the help of a well labeled diagram, explain the arrangement of a hydro-electric power station (4 marks)
- b) (i) Outline the causes of low power factor to an electrical power system (2 marks)
- (ii) State *five* main characteristics of a tariff used to analyses the billing of an electrical energy consumer (5 marks)
- (ii) Briefly explain the methods used to improve power factor to an electrical power system (5 marks)

- c) (i) Outline three types of insulators used to support transmission lines on conductor support (3 marks)
- (ii) Explain any three methods applied to prevent pollution flashover on insulator (6 marks)

SECTION `B`. ANSWER ANY TWO QUESTION IN THIS SECTION

- Q. 2** a) Briefly explain the meaning of a steam power generating system (3 marks)
- b) Outline *two* disadvantages of a steam power station (2 marks)
- c) State *five* factors to be considered when selecting a site for a steam power station (5 marks)
- d) With the help of a labeled diagram, describe the operation of a steam power station. (5 marks)
- Q.3** a) State *two* factors that contribute to the difference in terminal voltage of an alternator on load and non-load condition (2 marks)
- b) Explain *three* methods used to achieve alternator voltage regulation (8 marks)
- c) Discuss the operations of the following components of a magnetic amplifier
- (i) Control winding
- (ii) Output winding (4 marks)
- d) Explain how induction of a.c voltage is eliminated in the control winding of a magnetic amplifier (6 marks)
- Q. 4** a) (i) State any *four* requirements of conductor materials for overhead lines (2 marks)
- (ii) Explain the following conductor vibrations
- (i) Swing
- (ii) Galloping (4marks)
- (b) (i) Derive from the basic principles the equation for the sag of a transmission line when supports are at unequal levels (6 marks)
- (ii) An overhead line with stranded copper conductors is supported on two poles at a span of 215m having a difference of 12 m. the conductor diameter is 2.32cm and weighs 2.51kgf/m length. The maximum tensile strength of copper is 4410kg/cm² for a factor of safety of 4, determine;
- (i) The distance from the longer support to the lowest point of the conductor. (4 marks)
- (ii) The sag with respect to the lower support (4 marks)