



MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)
University Examinations for 2015/2016

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

SECOND SEMESTER EXAMINATION FOR DIPLOMA IN ELECTRICAL AND
ELECTRONICS ENGINEERING

EED 218: POWER SYSTEMS 1

DATE: 10/8/2016

TIME: 8:30 – 10:30 AM

INSTRUCTIONS TO CANDIDATES:

Answer question ONE and any other TWO questions

QUESTION ONE

- a) List any **Four** sources of electrical energy. (4 marks)
- b) Explain any **Four** advantages of electrical supply. (4 marks)
- c) With the aid of a schematic diagram explain the operation of a steam power plant. (4 marks)
- d) List any **Three** elements of a transmission system. (3 marks)
- e) Outline **Three** characteristics of a good;
 - i) Conductors
 - ii) Protective devices (4 marks)
- f) Highlight the **Five** advantages of suspension insulators. (5 marks)

- g) List any **Four** advantages of Hydro power plant. (4 marks)
- f) List any **Two** methods of improving string efficiency. (2 marks)

QUESTION TWO

- a) With reference to overhead lines:-
- i) Explain corona phenomenon
 - ii) State:-
 - a) Effects of corona.
 - b) Factors affecting corona. (9 marks)
- b) A 3 phase 220Kv 50Hz transmission line consists of 1.5cm radius conductor spaced 2metres apart in equilateral triangle formation. If the temperature is 40°C and atmospheric pressure is 76cm. Determine corona loss per km of the line. Take $M_0 = 0.85$. (11 marks)

QUESTION THREE

- a) State any **Four** factors to consider for the location of a Hydro power plant. (4 marks)
- b) State **Three** major advantages of AC distribution system as compared to DC distribution. (3 marks)
- c) A 33KV transmission line has 3 insulators, the capacitance between the shunt and line is 10%. Calculate;
- i) Voltage distribution
 - ii) String efficiency (9 marks)
- d) Explain any Two types of tariffs commonly applied in economics of supply (4 marks)

QUESTION FOUR

- a)
 - i) State the Kelvin's law. (2 marks)
 - ii) List any 3 assumptions when deriving Kelvin's law. (3 marks)
 - iii) Derive the Kelvin's law. (5 marks)
- b) An overhead line at a river crossing is supported from two towers 25 and 85metres above water level. The distance between the towers is 400m. The tension of the conductor is 1500 x 9.81N and its weight is 1.5kg/m.

Calculate:-

- i) Minimum clearance between line conductors and water surface.
- ii) Clearance of the conductor mid-way between supports. (10 marks)

QUESTION FIVE

- a) With the aid of a diagram list the major parts of an underground cable. (10 marks)
- b) Derive an expression for resistance of an underground cable. (4 marks)
- c) List any **Three** methods of laying underground cables. (3 marks)
- d) List any **Three** methods of reducing stresses in underground cables (3 marks)