



MACHAKOS UNIVERSITY

University Examinations for 2016/2017

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

SECOND YEAR SECOND SEMESTER EXAMINATION FOR DIPLOMA IN
ELECTRICAL AND ELECTRONICS ENGINEERING

EED 218: POWER SYSTEMS I

DATE: 5/6/2017

TIME: 8:30 -10:30 AM

INSTRUCTIONS

Answer Question One and Any Other Two Questions

QUESTION ONE (COMPULSORY) (30 MARKS)

- 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 hydro power plant. (4 marks)
- d) List any Three elements of a transmission system. (3 marks)
- e) Outline Three characteristics of a good;
 - i) supports
 - ii) insulator (4 marks)
- f) Highlight the Five advantages of suspension insulators. (5 marks)
- g) List any Four advantages of steam power plant. (4 marks)
- f) List any Two methods of improving string efficiency. (2 marks)

QUESTION TWO (20 MARKS)

- a) Explain the various costs in economics of scale in overhead lines (6 marks)
- b) A conductor cable 1km long is required to supply a constant current of 200A throughout the year. The cost of cable including installation is Ksh $(20A + 20)$ per metre where A is the area of cross-section of conductor in cm^2 . The cost of energy is shs 0.05 per Kwh and interest and depreciation is 10% calculate the most economical conductor size. Assume resistivity of conductor material to be $1.73 \mu - \Omega \text{ cm}$ (14 marks)

QUESTION THREE (20 MARKS)

- 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 (20 MARKS)

- 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) Derive an expression for 3 insulators in an overhead line. (10 marks)

QUESTION FIVE (20 MARKS)

- 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)