



MACHAKOS UNIVERSITY

University Examinations 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

SUPPLEMENTARY EXAMINATION

EED 218: POWER SYSTEMS 1

DATE: 28/8/2017

TIME: 8:30 – 10:30 AM

INSTRUCTIONS:

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 FOUR elements of a transmission system. (3 marks)
- e) Outline TWO 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 Hydro power plant. (4 marks)
- f) List any Two methods of improving string efficiency. (2 marks)

QUESTION (TWO)

- 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 300A throughout the year. The cost of cable including installation is Ksh $30A + 30$ per metre where A is the area of cross-section of conductor in cm^2 . The cost of energy is shs 0.6 per Kwh and interest and depreciation is 20% calculate the most economical conductor size. Assume resistivity of conductor material to be $1.84 \text{ micro } \Omega\text{-cm}$ (14 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 36KV transmission line has 3 insulators, the capacitance between the shunt and line is 11%. 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 4 assumptions when deriving Kelvin's law. (4 marks)
- iii) Derive the Kelvin's law. (5 marks)
- b) Derive an expression for 3 insulators in an overhead line (9 marks)

QUESTION (FIVE)

- a) With the aid of a diagram, Explain 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)