



MACHAKOS UNIVERSITY

University Examinations for 2020/2021 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

SECOND YEAR SECOND TERM EXAMINATION FOR

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

2601/201/P: POWER GENERATION AND TRANSMISSION

DATE: 9/6/2021

TIME: 8.30-11.30 AM

INSTRUCTIONS

ANSWER ALL QUESTIONS

QUESTION ONE

- a) List any **Four** sources of electrical energy (2 marks)
- b) Highlight the Five advantages of suspension insulators. (5 marks)
- c) Explain Two methods of improving string efficiency. (4 marks)
- d) Calculate the capacitance and charging current of a single core cable used on a 33Kv, 50Hz system. 2 Km long with a core diameter of 15cm and thickness of 6cm. Take relative permittivity of 5 (9 marks)

QUESTION TWO

- a) Explain the various costs in economics of scale in overhead lines (6 marks)
- b)
 - i Define a tariff (2 marks)
 - ii List any six characteristics of a desirable tariff (6 marks)

- iii A 33Kv 50HZoverhead line has 3 insulators forming a string. The capacitance between each insulator pin and earth is 12% of self capacitance. Calculate voltage distribution and string efficiency (6 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) Explain the differences between overhead and underground supply (9 marks)
- d) Explain any Two types of tariffs commonly applied in economics of supply (4 marks)

QUESTION FOUR

- a) Define the following terms
- i. Fusing current
 - ii. Arcing Voltage
 - iii. Restricking voltage (6 marks)
- b) With the aid of a diagram explain the operation of a rewirable fuse (4 marks)
- c) A 50Hz ,33Kv motor is earthed with a neutral of 10Ω per phase and is connected to a circuit breaker. The didturbance capacitor and neutral is 0.05 Micro Farad. Calculate
- i. Peak restricking voltage
 - ii. Frequency of oscillations
 - iii. Average rate of rise of restricking voltage (10 marks)

QUESTION FIVE

- a) With the aid of a diagram list the major parts of an underground cable. (4 marks)
- b) Derive an expression for resistance of an underground cable. (5 marks)
- c) Explain the Three methods of laying underground cables. (6 marks)
- d) A single core cable of conductor diameter 2cm and thickness of 0.8cm, has specific resistance of $7 \times 10^{14} \Omega\text{-cm}$. Calculate the insulation resistance for 5Km length of cable (5 marks)