



MACHAKOS UNIVERSITY

University Examinations for 2021/2022

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

THIRD YEAR FIRST SEMESTER EXAMINATION FOR

DIPLOMA IN ELECTRICAL ENGINEERING

EED 310: ELEMENTS OF POWER SYSTEMS

DATE: 14/12/2021

TIME: 8:30 – 10:30 AM

INSTRUCTIONS

ANSWER QUESTION one and any other two questions

1. a) Explain the following terms with reference to line classifications
 - i. Voltage regulation
 - ii. Transmission efficiency (6 marks)
 - b) Explain any THREE types of overhead line classification (4 marks)
 - c) Explain any FIVE characteristics of a desirable protection (10mks)
 - d) Explain the major conductor vibrations in overhead lines (10mks)
- 2a) Derive an expression of sag under equal levels (8mks)
- An overhead line at a river crossing is supported from two towers 30 and 90metres above water level. The distance between the towers is 500m. The tension of the conductor is $2000 \times 9.81\text{N}$ and its weight is 2.5kg/m .
- Calculate:-
- i) Minimum clearance between line conductors and water surface.
 - ii) Clearance of the conductor mid-way between supports. (12mks)
- 3a) With reference to overhead lines:-

i) Explain corona phenomenon

ii) State:-

a) Effects of corona.

b) Factors affecting corona.

(9mks)

b) A 3 phase 300Kv 50Hz transmission line consists of 4cm radius conductor spaced 2metres apart in equilateral triangle formation. If the temperature is 60°C and atmospheric pressure is 76cm.

Determine corona loss per km of the line. Take $M_0 = 0.8$

(11mks)

4a Explain the following terms with reference to vibrations

i dancing

ii Galloping

(6mks)

b Derive an expression for sending end voltage for single phase lines

(14mks)

5 a) Draw the circuit diagram of both nominal pie and tee medium lines

(10mks)

b) Explain the major factors to consider to reduce corona effect

(10mks)