



MACHAKOS UNIVERSITY

University Examinations 2016/2017

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

THIRD YEAR FIRST SEMESTER EXAMINATION DIPLOMA IN ELECTRICAL
ENGINEERING

EED 301: ELEMENTS OF POWER SYSTEMS I

DATE: 26/7/2017

TIME: 8:30 – 10:30 AM

INSTRUCTIONS:

Answer Question ONE And Any Other Two Questions

1. i) With reference to overhead lines:
 - a) Explain corona phenomenon
 - b) Effects of corona.
 - c) Factors affecting corona.

(10 marks)
- ii) Explain any FIVE characteristics of a desirable protection (10 marks)
- iii) Explain the major conductor vibrations in overhead lines
2. a) Derive an expression of sag under unequal levels (10 marks)
(8 marks)
- b) 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 2kg/m .

Calculate:-

Minimum clearance between line conductors and water surface.

(12 marks)

3. With reference to overhead lines:-
- a) Explain the following terms with reference to line classifications
 - i) Voltage regulation
 - ii) Transmission efficiency (6 marks)
 - b) List any THREE types of overhead line classification (3 marks)
 - c) A 3-Phase, 220 kV, 50 Hz transmission line consists of 30 mm diameter conductor spaced 2.5 meters apart in the form of an equilateral triangle. In the temperature is 38°C and atmospheric pressure is 76 cm, calculate the corona loss per km of the line. Assume the irregularity factor as 0.83. (11 marks)
4. a) Explain the following terms with reference to vibrations
- i) Dancing
 - ii) Galloping (6 marks)
- b) Derive an expression for sending end voltage for single phase lines. (14 marks)
5. a) Draw the circuit and phasor diagrams of both nominal pie and tee medium lines (10 marks)
- b) Explain the major factors affecting sag on overhead lines (10 marks)