MACHAKOS UNIVERSITY

University Examinations for 2016/2017

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

THIRD YEAR FIRST SEMESTER EXAMINATION FOR DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

EED 301: ELEMENTS OF POWER SYSTEMS 1

DATE: 31/5/2017 **TIME: 2:00 – 4:00 PM**

INSTRUCTIONS

Answer Question One and Any Other Two Questions

1. a) Explain the following terms with reference to overhead 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 (10 marks)

   d) Explain the major conductor vibrations in overhead lines (10 marks)

2. a) Derive an expression of sag under equal levels (8 marks)

   An overhead line at a river crossing is supported from two towers 25 and 85metres above water level. The distance between the towers is 400m. The tension of the conductor is 1500 x 9.81N and its weight is 1.5kg/m.
   Calculate:-
   i) Minimum clearance between line conductors and water surface.
   ii) Clearance of the conductor mid-way between supports. (12 marks)

3. a) With reference to overhead lines:-

   i) Explain corona phenomenon

ii) State:-

a) Effects of corona.

b) Factors affecting corona. (9 marks)

b) A 3 phase 220Kv 50Hz transmission line consists of 1.5cm radius conductor spaced 2metres apart in equilateral triangle formation. If the temperature is 40^0c and atmospheric pressure is 76cm.
Determine corona loss per km of the line. Take $M_O = 0.85$ (11 marks)

4. a) Explain the following terms with reference to vibrations in overhead lines

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 diagram of both nominal pie and tee medium lines. (10 marks)

b) Explain the major factors to consinder to reduce corona effect (10 marks)