



MACHAKOS UNIVERSITY

University Examinations 2017/2018

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

THIRD YEAR SECOND SEMESTER EXAMINATION

DIPLOMA IN ELECTRICAL ENGINEERING

EED 310: ELEMENTS OF POWER SYSTEMS II

DATE: 14/12/2017

TIME: 8:30 – 10:30 AM

INSTRUCTIONS:

ANSWER QUESTION ONE AND ANY OTHER TWO

1. a) Explain briefly the meaning and causes of three phase faults in transmission lines
(4 marks)
- b) Explain the following terms with reference to Faults
 - i) Positive sequence
 - ii) Negative sequence
 - iii) a' operator(6 marks)
- c) Explain the following terms with reference to protection
 - i) selectivity
 - ii) Discrimination(4 marks)
- d) In a 3-Phase, 4-wire system the currents in the RYB are
 $I_R \text{ equals } 200 \text{ at } 50^\circ \text{ A}$ $I_Y \text{ Equals } 70 \text{ at } 60^\circ \text{ A}$ $I_B \text{ equals } 250 \text{ at } 180^\circ \text{ A}$
Calculate all the sequence currents in the R (8 marks)
- e) Explain the major causes of surges in transmission lines (8 marks)

2. a) With reference to Three phase fault studies, explain the terms;
- Asymmetrical Faults
 - Symmetrical Faults (4 marks)
- b) Derive an expression for zero sequence in three phase faults (6 marks)
- c) The sequence voltages in the red phase are
- E_{R0} equals 100V E_{R1} equals 120-j90V E_{R2} equals -300V
- Calculate E_r, E_y, E_b (10 marks)
3. a) Explain with the aid of diagrams the operation of
- horn gap arrestor
 - arcing horn
 - rod gap
- (20 marks)
4. a) Explain the method of neutral earthing. (4 marks)
- b) Explain the major methods of Maintenance of Lightning Arresters (10 marks)
- c) Explain the earthing sequence of a transformer (6 marks)
5. a) With the aids of a diagram explain the operation of the following protection schemes
- Metz-price
 - buchholz relay (10 marks)
- b) Explain briefly some of the faults which occur on alternators (10 marks)