



MACHAKOS UNIVERSITY

University Examinations for 2016/2017

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

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

EED 310: ELEMENTS OF POWER SYSTEMS II

DATE: 2/6/2017

TIME: 8:30 – 10:30 AM

INSTRUCTIONS

Answer Question One and Any Other Two Questions

1.
 - a) Explain the following terms with reference to Faults
 - i) positive sequence
 - ii) negative sequence
 - iii) a' operator (6 marks)
 - b) List the assumptions made in analysis of asymmetrical faults (4 marks)
 - c) Explain the following terms with reference to protection
 - i) Pick up value
 - ii) actuating quantity (4 marks)
 - d) In a 3-Phase, 4-wire system the currents in the RYB are $I_R = 120$ at 30° A $I_Y = 70$ at 300° A $I_B = 80$ at 180° A
Calculate all the sequence currents in the R (8 marks)
 - e) Explain with reference to surge apparatus the following terms
 - i) Transmission factor

- ii) Reflection factor (8 marks)
2. a) With reference to Three phase fault studies, explain the terms;
- i) Asymmetrical Faults
- ii) Symmetrical Faults (4 marks)
- b) Derive an expression for Negative sequence in three phase faults (6 marks)
- c) The sequence voltages in the red phase are
 $E_{R0} = 120V$ $E_{R1} = 150 - j100V$ $E_{R2} = -200V$
 Calculate E_r, E_y, E_b (10 marks)
3. a) Explain with the aid of diagrams the operation of
- i) horn gap
- ii) arcing horn
- iii) earth wire (20 marks)
4. a) Explain the method of neutral earthing (4 marks)
- b) Derive the expression for the Peterson coil for capacitance of a coil. (10 marks)
- c) Explain the earthing sequence of a transformer (6 marks)
5. a) With the aid of a diagram explain the operation of the following protection schemes
- i) Metz-price
- ii) buchholz relay (10 marks)
- b) Explain briefly some of the faults which occur on alternators (10 marks)