



MACHAKOS UNIVERSITY

University Examinations 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**

SUPPLEMENTARY EXAMINATION

EED 310: ELEMENTS OF POWER SYSTEMS II

DATE: 1/9/2015

TIME: 8:30 – 10:30 AM

INSTRUCTIONS:

ANSWER QUESTION ONE AND ANY OTHER TWO

QUESTION ONE (COMPULSORY)

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 equals 100 at 30 A I_Y Equals 50 at 300A I_B equals 70 at 180A

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)

QUESTION TWO (20 MARKS)

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} equals 150V E_{R1} equals 160-j80V E_{R2} equals -100V

Calculate E_r , E_y , E_b (10 marks)

QUESTION THREE (20 MARKS)

a) Explain with the aid of diagrams the operation of

i) horn gap

ii) arcing horn

iii) earth wire (20 marks)

QUESTION FOUR (20 MARKS)

a) Explain the method of neutral earth (4 marks)

b) Derive the expression for the peterson for capacitance of a coil. (10 marks)

c) Explain the earthing sequence of a transformer (6 marks)

QUESTION FIVE (20 MARKS)

- a) With the aids 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)