MURANG'A UNIVERSITY OF TECHNOLOGY

SCHOOL OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

UNIVERSITY ORDINARY EXAMINATION

2018/2019 ACADEMIC YEAR

THIRDYEAR **FIRST** SEMESTER EXAMINATION FOR, DIPLOMA IN ELECTRICAL AND ELECTRONICS

SEE 1323 – ELECTRICAL PROTECTION SYSTEM

DURATION: 2 HOURS

DATE: 18TH APRIL 2019

TIME: 9:00-11:00 AM

Instructions to candidates:

1. Answer question One and Any Other Two questions.
2. Mobile phones are not allowed in the examination room.
3. You are not allowed to write on this examination question paper.

SECTION A: ANSWER ALL QUESTIONS IN THIS SECTION

QUESTION ONE (30 MARKS)

a) Define the following circuit breaker ratings:

(i) Breaking capacity

(ii) Making capacity

(iii) Short-time rating (6marks)

b) Explain any three faults that occur in a.c generator (6marks)

c) Explain three main factors to be considered in the design of transmission lines. (6marks)

d) Using diagrams explain the operation of current differential relay. (3marks)

e) State any three limitations of merz-prize current circulating scheme. (3marks)

f) Describe fault bus protection system as applied in bus-bar protection. (4marks)

SECTION B – ANSWER ANY TWO QUESTIONS IN THIS SECTION

QUESTION TWO (20 MARKS)

a) Define the following terms as used in electrical protection systems:

(i) Grounding

(ii) Isolated neutral system (4marks)

b) State any four advantages of neutral grounding. (5marks)

c) With a diagram explain operation process of 3-phase neutral grounding. (8marks)

d) A 33kv, 50 Hz, 3phase transmission line having a capacitance to the earth of each conductor as 4.5μf.calculate the reactance of Peterson coil suitable for this system. (3marks)

QUESTION THREE (20 MARKS)

a) Define the term voltage surge (2marks)

b) Explain four causes of voltage surge on a transmission system. (8marks)

c) Overhead ground wire provides an effective method of protection to transmission lines against direct lightening strokes:

i. State any two advantages and two disadvantages of ground wires over surge absorbers. (4marks)

ii. With the aid of a sketch diagram, describe how protection against lightening is achieved using ground wire. (6marks)

QUESTION FOUR (20 MARKS)

a) State two advantages and two disadvantages of solid state relay over electromechanical relay. (4marks)

b) Describe the following attributes of protection system and state two ways through which it is achieved:
(i) Reliability
(ii) Selectivity (8marks)

c) A 230kv, 3phase, 50 Hz, 200km transmission line has a capacitance to earth of 0.2 μF/km per phase. If the system is protected using Peterson coil method of earthing, calculate:
(i) Inductance of the coil.
(ii)KVA rating of the coil. (8marks)