



COLLEGE OF ENGINEERING, SCIENCE & TECHNOLOGY

**SCHOOL OF ELECTRICAL AND ELECTRONICS
ENGINEERING.**

DIPLOMA IN ELECTRICAL ENGINEERING

EED514 - ELECTRICAL POWER TRANSMISSION & DISTRIBUTION.

FINAL EXAMINATION - SEMESTER II - 2019.

DAY/DATE: ETT TIME: ETT. ROOM: ETT

Duration : 3Hours 10minutes

INSTRUCTIONS TO STUDENTS:

1. You are allowed 10 minutes **EXTRA** as reading time during which you are **NOT** to write.
2. Begin each answer on a fresh page and use both sides of the sheet.
3. Write your candidate number at the top of each attached sheet.
4. Insert all written foolscap, graph paper, drawing paper, etc. in their correct sequence and secure with a piece of string
5. Write clearly the number(s) of the question(s) attempted on the top of each sheet.
6. Answers to all questions must be written in **INK** on the Answer Sheet provided.
7. No programmable calculators are allowed.
8. Answer all questions.

QUESTION ONE

- (a) Identify the six (6) main types of conductors used for overhead line construction, outline their characteristics, and where they are used. (12 Marks)
- (b) With the aid of diagrams show any four (4) types of line supports. (8 marks)

QUESTION TWO

- (a) With the aid of diagrams outline the four (4) main types of vibrations experienced by the overhead line conductors. (6 marks)
- (b) Explain in your own words and with the aid of fully labeled diagrams how you would reduce the vibrations you have specified in Q2 (a) above. (4 marks)
- (c) An underground cable consists of one or more conductors covered with suitable insulation and surrounded by a protecting cover and as such outline any three necessary requirements it must fulfill? (6 marks)
- (d) The insulation resistance of a single-core cable is $495 \text{ M}\Omega$ per km. If the core diameter is 2.5 cm and resistivity of insulation is $4.5 \times 10^{14} \text{ M}\Omega\text{-cm}$, find the insulation thickness. (4 marks)

QUESTION THREE

- (a) (i) Define what corona is.
(ii) Name three factors that corona is dependent on.
(iii) Describe three side effects of corona. (8 Marks)
- (b) A string of three insulators is used to suspend one conductor of a 33 kV, 3-phase line. The air capacitance between each cap/pin junction to the tower is $1/5$ the capacitance of each unit. Draw the diagram and calculate the voltage across each insulator and the string efficiency. (12 Marks)

QUESTION FOUR

- (a) You have been asked by the System Engineer in your organisation to carry out a fault calculation on a number of feeders; what are the points to note in order for you to carry out the task on hand. (4 Marks)
- (b) What is the precaution to be observed with CT's and what are the dangers that will happen if this precaution is not observed? (5 marks)
- (c) What are the properties that need to be considered when selecting transformer oil? (8 marks)
- (d) Name any three (3) circuit breakers used in high voltage transmission. (3 marks)

QUESTION FIVE

- (a) What are the conditions that must be met before any two three-phase transformers are connected in parallel? (3 Marks)
- (b) With the aid of a diagram explain the DY11 connection of a transformer. (5 Marks)
- (c) A 11 kV, 50 Hz, 80 km single core lead sheathed cable has a conductor of radius 25 mm and lead sheath radius of 35 mm. (ϵ for lead is 3.6, ρ for copper is $1.71 \mu\Omega\text{-cm}$, ρ for insulation is $1.3 \times 10^8 \text{ M}\Omega\text{-cm}$).
Calculate:
- (i) Total resistance of the copper
 - (ii) The inductance
 - (iii) The capacitance
 - (iv) The insulation resistance
 - (v) The power loss due to the insulation resistance. (12 Marks)

THE END