



ZIMBABWE

**MINISTRY OF HIGHER AND TERTIARY EDUCATION,
INNOVATION, SCIENCE AND TECHNOLOGY DEVELOPMENT**

**HIGHER EDUCATION EXAMINATIONS COUNCIL
(HEXCO)**

NATIONAL CERTIFICATE

IN

ELECTRICAL POWER ENGINEERING

**MODULE: Overhead and Underground
Line Construction**

PAPER NO: 321/22/M09

DURATION: 3 hours

MAY/JUNE 2024 EXAMINATION

REQUIREMENTS

INSTRUCTIONS TO CANDIDATE

Answer all questions.

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CONSTRUCTION

QUESTION 1

- a) Explain how one may safely lift heavy equipment. (4 marks)
- b) What safety clothing should one wear when climbing high towers. (2 marks)
- c) Name four (4) types of rigging hardware. (4 marks)

QUESTION 2

- a) With the aid of a diagram show the following support structures used in overhead lines:
 - i) A-pole (2 marks)
 - ii) H-pole (2 marks)
- b) State reason why the above configurations are used. (2 marks)
- c) With reference to lattice steel towers for overhead lines describe the following construction setup.
 - i) Broad base (2 marks)
 - ii) Narrow base (2 marks)

QUESTION 3

Illustrate with diagrams the five different types of distribution support structures using poles. (10 marks)

QUESTION 4

- a) State two (2) purposes of overhead line insulators. (2 marks)
- b) Name two (2) types of materials used to construct overhead line insulators. (2 marks)
- c) Describe any two (2) characteristics of a line insulator. (2 marks)
- d) Name four types of overhead line insulators. (4 marks)

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QUESTION 5

- a) List three (3) types of materials used for line conductors and state one (1) advantage and one (1) disadvantage of each. (9 marks)
- b) State one (1) disadvantage of aluminium over copper in power line construction. (1 mark)

QUESTION 6

Draw and explain methods of laying underground cables. (10 marks)

QUESTION 7

Draw to show the following cable joints are used.

- a) Married joint
- b) Terminal joint
- c) Straight joint
- d) Britannia joint
- e) T-joint (10 marks)

QUESTION 8

Draw and label the Murray loop test diagram for earth loop. (10 marks)

QUESTION 9

- a) Briefly describe the function of the following components on an overhead line support structure.
 - i) Cross arm
 - ii) Clamps
 - iii) Stay rod
 - iv) Phase plates (8 marks)
- b) State two factors that influence the choice of a support structure for overhead transmission lines. (2 marks)

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QUESTION 10

- a) Name five (5) duties of a linesman. (5 marks)
- b) What are crossing guards in power line construction. (2 marks)
- c) Give three (3) types of guards used in power lines. (3 marks)

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