SCAN

Name _____ Index No. _____/_____

1202/315
ELECTRICAL MAINTENANCE AND
FAULT DIAGNOSIS
June/July 2013
Time: 3 hours

Candidate's Signature _____

Date _____

THE KENYA NATIONAL EXAMINATIONS COUNCIL

ELECTRICAL INSTALLATION CRAFT

ELECTRICAL MAINTENANCE AND FAULT DIAGNOSIS

3 hours

INSTRUCTIONS TO CANDIDATES

Write your name and index number in the spaces provided above.
Sign and write the date of the examination in the spaces provided above.
You should have Mathematical tables and scientific calculator.
*Answer any **FIVE** of the following **EIGHT** questions in the spaces provided in this question paper.*
All questions carry equal marks.
Candidates should answer the questions in English.

For Examiner's Use Only

Questions	1	2	3	4	5	6	7	8	TOTAL
Marks									

This paper consists of 16 printed pages.

Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

Turn over

1. (a) State the **two** types of alloy materials used in the manufacture of heating elements. (2 marks)

(b) Explain the following with reference to water heating

(i) Immersion heaters
(ii) Electric geysers. (4 marks)

(c) With aid of a labelled diagram.

(i) explain the working principle of an electric iron box.
(ii) describe how a water filled electric kettle connected to a supply senses that it is about to boil dry and opens the supply contacts. (14 marks)

2. (a) Explain the following terms with reference to electrical installations.

(i) Earth leakage
(ii) Bonding of services. (4 marks)

(b) Explain any **three** precautions required in bathrooms and similar rooms to avoid danger from the electrical installation. (6 marks)

(c) (i) A factory building is supplied from a three phase mains supply and from a three-phase standby diesel engine generator.
Draw the circuit diagram indicating how automatic changeover is achieved.

(ii) A murray loop test is used to locate an earth fault on a 6 km 2-core underground cable. If balance is obtained at a resistance of 96Ω against 34Ω respectively, determine the distance of the fault from the test end. (10 marks)

3. (a) State any **two** properties of a good refrigerant. (2 marks)

(b) With the aid of a labelled diagram, explain the principle of operation of an absorption type refrigeration system. (10 marks)

(c) (i) Explain the following with reference to air conditioning

(I) supply air
(II) return air

(ii) Outline any **four** heat sources which determine the amount of cooling load subjected to the air conditioning equipment. (8 marks)

4. (a) State any **three** conditions to be met when performing a mechanical inspection on a motor and its control gear. (3 marks)

(b) Explain any **two** causes and remedies for the following faults in a dc motor

(i) Brush chattering.
(ii) Erratic starting performance and takes an excessive current both at starting and running. (8 marks)

(c) With aid of a labelled diagram explain how the earth test with growler is carried out to locate a fault in a dc armature. (9 marks)

5. (a) State;

(i) **one** error associated with moving iron instruments and how they are reduced.

(ii) **two** disadvantages of dynamometer type of instruments. (4 marks)

(b) With the aid of a labelled diagram, describe the construction and principle of operation of a reed type frequency meter. (10 marks)

(c) A measuring instrument having internal circuit resistance of 4Ω gives full scale deflection when a current of 10mA flows through it. If a series and shum resistance of 320 kΩ and 57$\mu\Omega$ respectively is added to the instrument circuit, determine the maximum values of voltage and current the instrument can be able to measure. (6 marks)

6. (a) State any **four** causes of a three-phase induction motor failing to start. (4 marks)

(b) A three-phase induction motor drive uses a star-delta starter for its starting to ensure good performance, explain the tests to be carried out on the

(i) Motor
(ii) Starter (8 marks)

(c) Explain why great care should be taken when transporting or positioning a motor during its installation. (4 marks)

(d) Explain the main functions of a totally enclosed flame proof type of motor enclosure. (4 marks)

7. (a) Describe the following types of maintenance

(i) Predictive
(ii) Opportunistic (6 marks)

(b) State any **four**;

(i) advantages of planned maintenance;
(ii) functions of an electrical maintenance department. (8 marks)

(c) List any **six** factors to be considered when planning a preventive maintenance programme. (6 marks)

8. (a) State any **three** causes of the following symptoms in fluorescent lamps.

(i) Lamp fails to start and the ends glow dull & reddish.
(ii) Lamp fails to start and there is no end glow.
(iii) Lamp flashes ON and OFF. (9 marks)

(b) Explain the function of the following in discharge lamps

(i) choke;
(ii) capacitor across the supply terminals. (4 marks)

(c) With aid of a labelled diagram, explain the construction and operation of high-pressure mercury-vapour lamp. (7 marks)