Candidate's Name _____ Index No. _____/____

1202/315
ELECTRICAL MAINTENANCE AND
FAULT DIAGNOSIS
June/July 2012
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 examination in the spaces provided above.
You should have the following for this examination:
Mathematical tables
Scientific calculator (battery operated)
*Answer any **FIVE** of following **EIGHT** questions in the spaces provided.*
*Do **NOT** remove any pages from this booklet.*

For Examiner's Use Only

Question						Total Score
Candidate's Score						

This paper consists of 12 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) Explain the following sources of instrument errors:-

(a) harmonics;
(b) temperature;
(c) surges.

(6 marks)

(b) With the aid of diagrams explain the following damping methods used in instruments:-

(i) eddy current;
(ii) gravity control.

(6 marks)

(c) Calculate the value of resistor required to enable a 1mA FSD, 100 Ω basic instrument to read:-

(i) up to 10mA;
(ii) up to 10V.

(8 marks)

2. (a) Explain with the aid of a labelled diagram the operation of Megger. (6 marks)

(b) Explain how a fall-of-potential test may be used to locate a fault in a circuit consisting of similar conductors. (6 marks)

(c) A short circuit fault is located by Varley loop test. The ratio arms are set at P = 8 and Q = 12 and the values of the variable resistances are 18Ω and 7 Ω for position 1 and 2 of the switch respectively. The sound and faulty cables are identical and have a resistance of 0.5 Ω per km. Determine the length of each cable and the distance of the fault from the test end. (8 marks)

3. (a) State any **two** faults that occur in electric cookers. (2 marks)

(b) With the aid of a diagram explain the operation of the following:-

(i) simmerstat;
(ii) electric control of a refrigerator.

(12 marks)

(c) Explain the use of the following in refrigeration:-

(i) cooling towers;
(ii) fins in condensers.

(6 marks)

4. (a) State any **four** objectives of preventive maintenance. (4 marks)

(b) Describe the following types of maintenance:-

(i) corrective maintenance;
(ii) scheduled maintenance.

(4 marks)

(c) Describe any **two** important documents kept by the maintenance department. (4 marks)

(d) Explain the following terms used in maintenance:-

(i) planning;
(ii) scheduling.

(4 marks)

(e) State any **four** advantages of proper planning. (4 marks)

5. (a) Differentiate between cold cathode and hot cathode in discharge lamps. (4 marks)

(b) State the causes and remedies of a switch start fluorescent lamp circuit when the lamp takes excessive time to start. (6 marks)

(c) With the aid of a diagram show how a lead lag circuit can be used to overcome stroboscopic effect in a switch-stat circuit. (4 marks)

(d) Explain with the aid of a labelled diagram the operation of a sodium discharge lamp. (6 marks)

6. (a) State any **three** motor drives. (3 marks)

(b) Describe the following braking methods used in induction motors:-

(i) dynamic braking;
(ii) plug reversing.

(6 marks)

(c) With the aid of a labelled diagram explain how the dynamometer or eddy current brake test may be carried out for an induction motor. (11 marks)

7. (a) With the aid of a diagram explain the duct ventilated type of motor enclosure. (4 marks)

(b) Outline **three** causes and remedies of the following symptoms in d.c. machines:

(i) motor starts with difficulty accompanied by excessive heating of the rheostatic starter;

(ii) the motor refuses to start. (12 marks)

(c) Draw a labelled circuit diagram of the Swinburne test to determine the efficiency of a d.c. machine. (4 marks)

8. (a) State any **four** precautions to be observed when using a multimeter. (4 marks)

(b) Explain the importance of a circuit diagram in system maintenance and fault diagnosis. (10 marks)

(c) State any **three**

(i) advantages of a Cathode Ray Oscilloscope over a multimeter when used in fault diagnosis;

(ii) causes of pre-mature failure of silicon transistor. (6 marks)