

1202/315
ELECTRICAL MAINTENANCE
AND FAULT DIAGNOSIS
June/July 2009
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

ELECTRICAL INSTALLATION CRAFT

ELECTRICAL MAINTENANCE AND FAULT DIAGNOSIS

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:

*Answer booklet
Mathematical Tables/Calculator*

*Answer any FIVE of the following EIGHT questions.
All questions carry equal marks.*

This paper consists of 3 printed pages.

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

1. (a) State any four:
(i) reasons for carrying out regular maintenance and repairs on electrical equipment;
(ii) duties of a maintenance engineer. (8 marks)
- (b) Explain the:
(i) meaning of the term 'servicing' with regards to maintenance;
(ii) factors to be considered in a preventive maintenance programme. (8 mark)
- (c) Distinguish the difference between routine and planned maintenance. (4 marks)
2. (a) State two advantages of:
(i) electrostatic equipment;
(ii) instrument transformers over shunts and multipliers. (4 mark)
- (b) With the aid of a labelled circuit diagram, explain the principle of operation of an electro-dynamometer meter. (8 marks)
- (c) A milliammeter whose resistance is 3Ω reads upto 100mA at full scale deflection. Calculate the resistance necessary to be connected with this meter to enable it to be used for reading upto:
(i) 10 volts;
(ii) 10 amperes. (8 marks)
3. (a) Distinguish between 'refrigeration' and 'air conditioning'. (4 marks)
- (b) State:
(i) any **two** properties of refrigerant;
(ii) the function of an expansion valve in the refrigerator. (4 marks)
- (c) With aid of a labelled diagram, explain how the electrical control of a vapour compression type refrigeration system operates. (8 marks)
- (d) State any **two** possible causes of the following:
(i) when compressor motor in the refrigerator keeps running but no cooling effect takes places;
(ii) compressor hums and trips on overload. (4 marks)
4. (a) State the causes and remedies of the following symptoms in electric motors:
(i) overheats while running;
(ii) connected correctly but cannot run;
(iii) will not reach full speed;
(iv) produces excessive noise when running.. (10 marks)

- (b) Describe with reference to d. c. machines and its effects to:
- commutation;
 - how commutation may be minimized. (10 marks)
5. State the effects when a transformer is contaminated with:
- sludge;
 - moisture. (6 marks)
- (b) With reference to transformer oil, explain the following properties:
- I insulation;
 - II viscosity;
 - III purity.
- (ii) The crackle test. (6 marks)
- (c) With aid of a labelled circuit diagram, describe the tests that determine losses in a transformer. (8 marks)
6. (a) State **two**:
- kinds of discharge lamps;
 - functions of a capacitor in fluorescent luminaire circuits. (4 marks)
- (b) Describe with aid of a circuit diagram the operation of a high pressure mercury vapour lamp. (10 marks)
- (c) State the causes and remedies of the following faults in fluorescent lamp circuits:
- lamp flickers and does not start;
 - when choke overheats. (6 marks)
7. (a) State any **three** types of faults that are likely to occur on cables. (3 marks)
- (b) With aid of a circuit diagram, explain how the fall of potential test may be used to locate the position of an earth fault in a cable. (13 marks)
- (c) An earth fault occurs on one core of 500m length of a twin cable. A loop test is made and a slide wire 2 meter long is used. The balance point obtained is 400 mm from the end connected to a faulty core. Using Murray loop-test, determine the position of the fault. (4 marks)
8. (a) State any **four** possible faults and remedies for the failure of operation of an electric kettle. (8 marks)
- (b) With aid of a labelled diagram explain the operation of a non-pressure type water heater. (12 marks)