

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  $3\Omega$  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:
- (i) commutation;
  - (ii) how commutation may be minimized. (10 marks)
5. State the effects when a transformer is contaminated with:
- (i) sludge;
  - (ii) moisture. (6 marks)
- (b) With reference to transformer oil, explain the following properties:
- (i) 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**:
- (i) kinds of discharge lamps;
  - (ii) 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:
- (i) lamp flickers and does not start;
  - (ii) 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)