1521/205
1601/205
ELECTRICAL INSTALLATION II, ESTIMATING AND TENDERING, INDUSTRIAL MACHINES AND CONTROL
June/July 2016
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

CRAFT CERTIFICATE IN ELECTRICAL AND ELECTRONIC TECHNOLOGY
(POWER OPTION)
MODULE II

ELECTRICAL INSTALLATION II, ESTIMATING AND TENDERING,
INDUSTRIAL MACHINES AND CONTROLS

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:

Non-programmable scientific calculator;
A mathematical table; and
Answer booklet;

*This paper consists of **THREE** sections; **A, B** and **C**.*
*Answer any **TWO** questions from section A, **TWO** question from section **B** and **ONE** question from section **C**.*
All questions carry equal marks.
Maximum marks for each part of a question are as shown.
Candidates should answer the questions in English.

This paper consists of 5 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

SECTION A : ELECTRICAL INSTALLATION II

*Answer any **TWO** questions from this section.*

1. (a) (i) Explain the term "corrosion" as used in electrical installations.

(ii) State:

(I) **Two** conditions necessary for corrosion to occur;

(II) **One** effect of corrosion in an electrical installation. (6 marks)

(b) Explain **three** requirements of a temporary installation. (6 marks)

(c) List **four** adverse conditions that are likely to be encountered in agricultural and horticultural installations. **(4 marks)**

(d) Explain the function of each of the following component parts of an earthing system:

(i) Earth terminal;

(ii) Earth electrode. **(4 marks)**

2. (a) State:

(i) the extra-low voltage levels for a.c and d.c circuits.

(ii) **three** examples of extra-low voltage circuits. **(5 marks)**

(b) With aid of a labelled circuit diagram, explain how a relay is used to operate an electric bell. **(5 marks)**

(c) (i) Explain **two** requirements of a manual cam point.

(ii) With aid of a labelled diagram, explain the operation of an electric buzzer. (10 marks)

3. (a) Define the term 'power-factor'. (2 marks)

(b) The power taken by a 415V, 50Hz three phase star-connected motor is 60 kW at 0.75 pf lagging. A bank of capacitors is connected across the supply to improve the power factor to 0.9 lagging.

(i) Sketch the vector diagram;

(ii) Determine the rating (KVAR) of the capacitors per phase required to raise the power factor.

(10 marks)

(c) List **two** components of the following costs of electricity supply:

(i) standing costs;
(ii) running costs.

(4 marks)

(d) Explain the following types of tariffs

(i) Two - part;

(ii) Block - rate.

(4 marks)

SECTION B : INDUSTRIAL MACHINES AND CONTROLS

*Answer any **TWO** questions from this section.*

4. (a) (i) Explain **two** causes of earth faults on the commutator of a d.c motor.

(ii) State **three** tests which must be carried out before assembling an electric motor.

(7 marks)

(b) Outline the:

(i) Procedure of inspection of a motor.

(ii) Steps to be followed after rewinding a motor.

(8 marks)

(c) State:

(i) **two** features of a hysteresis motor.

(iii) **three** IEE regulations regarding safe-use and protection of electric motors.

(5 marks)

5. (a) Describe a 'programmable logic controller' in relation to manufacturing industries.
(4 marks)

(b) State **three**:

(i) Output components used in PLC's

(ii) Programming languages in PLC's.

(6 marks)

(c) An electric motor is fitted with four safety sensors. When there is an input to any **one** of these sensors the motor must stop and an alarm sounds.

(i) Write a ladder program for the circuit;

(ii) Draw the equivalent ladder diagram for C(i).

(10 marks)

6. (a) (i) State **two** applications of instrumentation systems.

(ii) Explain **three** factors considered when selecting an electric transducer for a particular use.
(8 marks)

(b) Draw a labelled diagram of a magnetic tape recorder used in instrumentation systems.
(10 marks)

(c) The recorded wavelength by a tape recorder is 12.0 micrometer. Determine the tape speed at a frequency response of 300 kHz.
(2 marks)

SECTION C : ESTIMATING AND TENDERING

*Answer any **ONE** question from this section.*

7. (a) Define the following terms as used in illumination:

(i) Lumen
(ii) Luminous flux.

(4 marks)

(b) A lamp with a luminous Intensity of 60 Cd in all directions provides illumination of 26.7 lux at the surface of a table directly below the lamp.

Determine:

(i) Height of the lamp above the table;
(ii) Illumination that would be provided at the table surface by changing the lamp to one of 100 cd and reducing the height by 6.7 cm.

(6 marks)

(c) Distinguish between brightness and glare. (6 marks)

(d) (i) Write an equation for determining illumination by Lumen method.
(ii) Define each parameter in d(i)

(4 marks)

8. (a) Outline the information provided by the following tender documents.

(i) B.O.Q.
(ii) Specifications.

(4 marks)

(b) Explain the following remedies for breach of contract

(i) Rescission.
(ii) Damages.

(4 marks)

(c) Explain **four** factors that a contractor should consider before making a 'decision to tender'. (8 marks)

(d) List **four** ways in which two parties can enter a contract. (4 marks)

THIS IS THE LAST PRINTED PAGE