

Name \_\_\_\_\_

Index No. \_\_\_\_\_

1521/205

Candidate's Signature \_\_\_\_\_

1601/205

**ELECTRICAL INSTALLATION II  
ESTIMATING & TENDERING,  
INDUSTRIAL MACHINES & CONTROLS**

Date \_\_\_\_\_

Oct/Nov 2012

Time: 3 hours



**THE KENYA NATIONAL EXAMINATIONS COUNCIL**

**CRAFT CERTIFICATE IN ELECTRICAL AND ELECTRONIC ENGINEERING  
(POWER OPTION)**

**ELECTRICAL INSTALLATION II, ESTIMATING AND TENDERING, INDUSTRIAL MACHINE  
AND CONTROLS**  
**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 the following for this examination:*

*Scientific calculator battery operated.*

*This paper consists of TWO sections; A and B.*

*Answer THREE questions in section A and TWO questions in section B in the spaces provided.*

*Maximum marks for each part of a question are as indicated.*

**For Examiner's Use Only**

**SECTION A**

Question	1	2	3	4	5	TOTAL
Marks						

**SECTION B**

Question	6	7	8	TOTAL	GRAND 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.**

## SECTION A

Answer any **THREE** questions in this section.

1. (a) Define the following terms as used in electrical installation.
- (i) Trunking
  - (ii) Joint box
  - (iii) Luminaire
- (6 marks)
- (b) Explain how the following factors affect the type of a wiring system to be used in an installation.
- (i) cost
  - (ii) flexibility
  - (iii) durability
  - (iv) appearance
- (8 marks)
- (c) State **three** IEE Regulation requirements for the installation of conductors and wiring systems.
- (6 marks)
2. (a) (i) Define a 'Damp situation'.
- (ii) State the IEE Regulation regarding a(i)
- (4 marks)
- (b) (i) Explain the reasons why, Agricultural and Horticultural installations are regarded to as special installations.
- (ii) Distinguish between Division 1 and Division 2 types of hazardous areas.
- (6 marks)
- (c) (i) State **two** essential parts of a telephone circuit.
- (ii) With aid of a labelled circuit diagram, explain the operation of a two-way communication system.
- (10 marks)
3. (a) (i) State any **three** disadvantages of D.C shunt motor speed control using the armature control method.
- (ii) With aid of a circuit diagram explain the flux method of speed control for a d.c. motor.
- (12 marks)
- (b) Illustrate with aid of a diagrams how reversal on direction of rotation is achieved in a d.c. series motor.
- (4 marks)

- (c) State:
- (i) **Three** essential requirements of a d.c. face plate starter.
  - (ii) **One** advantage and disadvantage of d.c. motors as compared to A.C. motors. (4 marks)
4. (a) Describe the following types of motor enclosures.
- (i) Drip proof.
  - (ii) Screen protected. (4 marks)
- (b) Outline the routine inspection and tests carried on a three-phase cage induction motor. (10 marks)
- (c) With aid of a block diagram describe the essential elements of an instrumentation system. (6 marks)
5. (a) Distinguish between an Estimate and a Tender. (4 marks)
- (b) (i) Explain the process of selective tendering.
- (ii) State **two** disadvantages of open tendering. (12 marks)
- (c) Describe **two** ways, material listing may be carried out from a complete electrical drawings by an estimator. (4 marks)

## SECTION B

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

6. (a) Define the following terms as used in illumination engineering.
- (i) lumen;
  - (ii) Glare;
  - (iii) Reflection factor. (6 marks)
- (b) (i) State the Cosine law of illumination.
- (ii) A room 10m x 7m x 4m is to have an average illuminance of 300 Lux on a working plane 0.85m above the floor. Assuming the utilization factor to be 0.6 and maintenance factor of 0.8. Determine the number of lamps to be installed. Indicate on a diagram a suitable arrangement and assume each lamp to be new rated at 5000 lumens and a spacing/height ratio of 1.0. (14 marks)
7. (a) (i) State **three** advantages of programmable logic controllers (PLC's) over ordinary computers.
- (ii) With aid of a diagram illustrate the internal architecture of a plc. (12 marks)
- (b) (i) Explain safety precautions to be observed when working with electric motors.
- (ii) State any **one** IEE regulations requirements regarding final circuits supplying motors. (8 marks)
8. (a) Define the following types of electricity tariffs.
- (i) Two part tariff;
  - (ii) Power factor tariff;
  - (iii) Flat-rate tariff. (6 marks)
- (b) A 3-phase 5Kw induction motor has a power factor of 0.7 lagging at full load.
- (i) Determine the rating of capacitor to be connected in each phase to improve power factor of the motor to 0.9 lagging.
  - (ii) Draw the resulting phasor diagram. (12 marks)
- (c) State **two** disadvantages of low power factor to a consumer. (2 marks)