

Name _____

Index No. _____

1521/205

Candidate's Signature _____

1601/205

Date _____

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

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)