ELEC SOLAR INSTALLATION TECHNOLOGY
OCT/NOV 2017

SECTION A

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

1. (a) State **one** application of the following workshop tools and in each case describe **one** safety precaution to be observed while using the tool:

(i) combination pliers;
(ii) screw driver;
(iii) adjustable conduit pipe stock and die.

(6 marks)

(b) Explain application areas of each of the following cables:

(i) PVC - insulated single core;
(ii) MIMS;
(iii) Armoured cable.

(3 marks)

(c) Explain how Lug terminations of cables is achieved. (6 marks)

(d) A friend of yours accidentally touches a live conductor in a workshop and becomes unconscious while still holding the conductor. Explain what you will do.

(5 marks)

2. (a) State any **four** factors that affect the choice of a wiring system. (4 marks)

(b) Explain how the following factors affect cable rating:

(i) ambient temperature;
(ii) type of excess current protection;
(iii) thermal insulation.

(6 marks)

(c) A PVC twin and earth cable domestic installation consists of the following:

A 4 - way consumer unit (ccu)
4 lamps, each 2 W controlled by 1 switch, and 2 lamps each 15 W controlled by 2 switches.
An immersion heater rated at 3 W
An electric cooker rated 12 kW plus a socket outlet on the cooker control unit
6, 13 A socket outlets and a spur

Draw the wiring diagram for the above installation. (10 marks)

3. (a) Define the following terms as used in electric circuit protection:

(i) fuse rating;
(ii) fusing current;
(iii) fusing factor;
(iv) discrimination.

(4 marks)

(b) Explain the significance of the following tests in an installation:

(i) earth electrode resistance;
(ii) polarity;
(iii) continuity test.

(6 marks)

(c) (i) With the aid of a labelled diagram, describe the operation of a single phase current operated Earth Leakage Circuit Breaker (ELCB).

(ii) Explain **two** drawbacks of the ELCB in c(i).

(10 marks)

4. (a) (i) Explain how an electric shock occurs.
(ii) Draw a labelled diagram of main sections of PI/Lc/SWA cable.

(6 marks)

(b) Draw a labelled diagram of a typical grid system applicable in Kenya and indicate the various standard voltage levels. (6 marks)

(c) Draw an alarm system for the protection of a three-storey building with each floor having two push buttons and a bell. Incorporate a main alarm bell and an indictor board. (8 marks)

SECTION B

Answer any TWO questions from this section.

5. (a) Define the following terms with respect to solar energy:

(i) solar module;
(ii) array.

(4 marks)

(b) Explain:

(i) using a diagram, how a solar cell works;
(ii) **four** factors to be considered while choosing a solar panel for a domestic house.

(10 marks)

(c) Explain **three** routine maintenance procedures that need to be carried on a solar charged lead acid battery. (6 marks)

6. (a) Distinguish between:

(i) constant voltage charging and constant current charging;
(ii) self discharge and overcharge.

(4 marks)

(b) Explain **three** indicators of a fully charged lead acid battery. (6 marks)

(c) Explain:

(i) **two** advantages of solar electric power over conventional generators;
(ii) **three** essential features for equipment at consumers intake point.

(10 marks)

7. (a) Define the following terms:

(i) photovoltaic effect;
(ii) photoelectric effect.

(2 marks)

(b) Using diagrams explain how solar energy is harvested using the following:

(i) parabolic dish collectors;
(ii) flat plate collectors.

(6 marks)

(c) Explain **three** factors that may change the output power of a solar system.

(6 marks)