

OCT/NOV 2012

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 P/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 indicator 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)