



**UNIVERSITY EXAMINATIONS**  
**SECOND YEAR EXAMINATION FOR THE AWARD OF**  
**THE DEGREE OF BACHELOR OF SCIENCE IN RENEWABLE ENERGY**  
**FIRST SEMESTER 2021/2022**  
**(FEBRUARY – JUNE, 2022)**

**PHRE 217: ELECTRICAL INSTALLATION**

**STREAM: Y2 S1**

**TIME: 2 HOURS**

**DAY: MONDAY, 3:00 PM – 5:00 PM**

**DATE: 16/05/2022**

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**INSTRUCTIONS**

- 1. Do not write anything on this question paper.**
- 2. Answer Question ONE and any other TWO questions.**

**QUESTION ONE (30 MARKS)**

- a) Explain the importance of safety regulations in electrical installation (4 marks)
- b) Outline any three causes of electric fires (3 marks)
- c) List two type of tools used in electrical installation and give one example for each. (4 marks)
- d) Outline any two renewable sources of electrical energy and two non-renewable sources of electrical energy. (4 marks)
- e) For each of the authorities listed below, outline any two of its functions in the generation and supply of electrical energy.
  - i. Kenya Power
  - ii. REREC (4 marks)
- f) Sketch the BS 3939 electrical symbols for each of the following items used in electrical installation.

- i. Consumer control unit
  - ii. Two way switch
  - iii. Socket outlet.
- (3 marks)

g) Outline the two basic parts of an electrical cable giving an example of a suitable material for each part

(4 marks)

h) Explain the term “Earthing” as used in electrical installation.

(2 marks)

i) List any two types of tests carried out on a completed electrical installation.

(2 marks)

### **QUESTION TWO (20 MARKS)**

a. State any five measuring instruments used in electrical installation and for each state the respective quantity it is used to measure.

(5 marks)

b. Draw a labeled diagram of a 3 phase four wire distribution system showing both single and 3 phase supply

(5 marks)

c. i. Name any two hydroelectric power stations in Kenya

(2 marks)

ii. State three advantages of a hydro-electric power station as compared to thermal power station.

(3 marks)

iii. Draw a labeled layout diagram of a hydroelectric power station

(5 marks)

### **QUESTION THREE (20 MARKS)**

a) Explain the term final circuit.

(2 marks)

b) Explain any four types of final circuits.

(4 marks)

c) Draw a final circuit with three lamps such that L1 and L2 are connected in parallel and are controlled by one-gang one way switch S1 and lamp L3 looped in from the same circuit and controlled by switch S2 only.

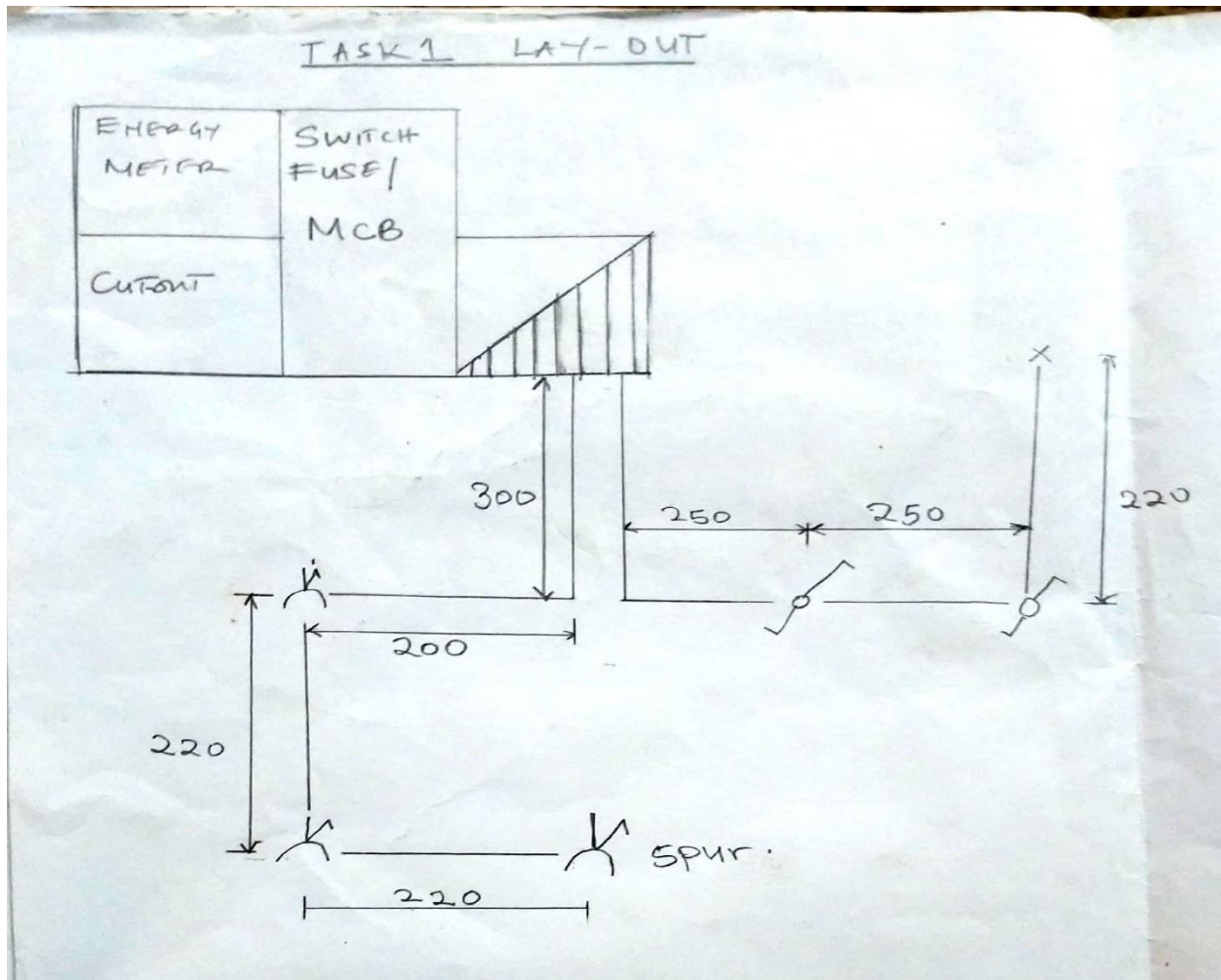
(4 marks)

d). Draw a labelled diagram of the sequence of control at the consumer’s intake point and indicate the supply authority and the consumer’s equipment.

(4 marks)

e).The diagram below shows a layout of two final circuits. The socket outlets are wired in radial. If you are required to use PVC sheathed system of wiring for the installation, estimate the material requirement for the installation.

(6 marks)



#### QUESTION FOUR (20 MARKS)

a). State two properties each of the following materials used in electrical cables;

i) Copper

ii) Rubber

(4 marks)

b). Explain the difference between a joint and a termination as used in electrical cables.

(2 marks)

- c). i. State two:
- a). reasons for stranding conductors of a cable.
  - b). IEE requirements concerning cables.
- (4 marks)
- iii. Outline the factors affecting the current carrying capacity of cables
- (4 marks)
- iii. Draw a labeled diagram of a PILCSWA cable.
- (4 marks)
- d).Outline any two factor to consider when selecting a wiring system for a given installation.
- (2 marks)

**QUESTION FIVE (20 MARKS)**

- a) Explain the following terms as used in electrical protection.
- i. Short circuit.
  - ii. Over current.
- (2 marks)
- b) Define the following:
- i. Earth electrode
  - ii. Earth lead
- (4 marks)
- c) Distinguish between fuse rating and fusing current as used in electrical protection.
- (2 marks)
- d) Draw a labeled diagram of a rewirable fuse
- (4 marks)
- e) i. define the term circuit breaker
- ii. Outline two merits of a circuit breaker
  - iii. Name four tests carried out in a completed installation.
- (8 marks)