higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE:
MULTI-DISCIPLINARY DRAWING OFFICE PRACTICE

ELECTRICAL DRAUGHTING

(8080265)

13 August 2021 (X-paper)
09:00–13:00

REQUIREMENTS: **A4 drawing sheets; computer-aided draughting equipment and related software**

Drawing instruments and nonprogrammable calculators may be used.

This question paper consists of 4 pages and a diagram sheet of 4 pages.

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ELECTRICAL DRAUGHTING
TIME: 4 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer all the questions (theory and drawings) on drawing paper. DO NOT use a separate ANSWER BOOK to answer any of the questions.

2. Read all the questions carefully.

3. Number the answers according to the numbering system used in this question paper.

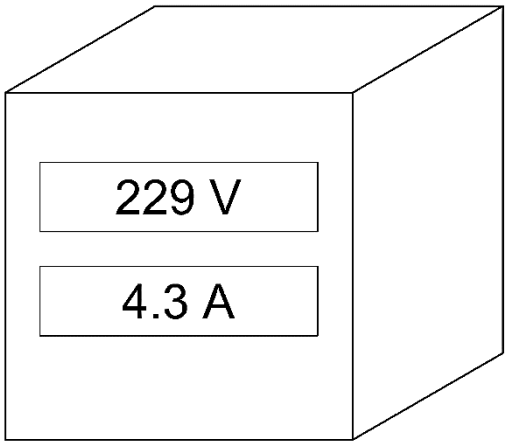
4. Marks will be allocated for the following:
    - Balanced layout and size
    - Correctness
    - Lettering
    - Line work and neatness

5. Write neatly and legibly.

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QUESTION 1: GENERAL THEORY

Study the drawing of an electrical meter below and answer the questions.



1.1 Draw a circuit diagram with graphical symbols to show how the meter above is connected to a circuit. (7)

1.2 What is the voltage reading on the meter? (2)

1.3 What is the current reading on the meter? (2)

1.4 What is the resistance of the circuit? (3)

1.5 What is the power consumption of the circuit? (3)

1.6 Name ONE application of this kind of meter. (1)

1.7 Is it a single-phase or three-phase meter?

Give ONE reason for your answer. (2)

[20]

QUESTION 2: GRAPHICAL SYMBOLS AND ELECTRONIC DIAGRAMS

FIGURE 1 on the DIAGRAM SHEET (attached) represents a freehand drawing of a circuit diagram of a simple microprocessor boot loader.

Draw the circuit diagram with the correct IEC graphical symbols, labels for each component, and a table containing the functions of switches so that the completed drawing will be ready for reproduction. **[20]**

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QUESTION 3: GENERATION AND DISTRIBUTION OF ELECTRICITY

FIGURE 2 on the DIAGRAM SHEET (attached) represents a schematic layout of a GRID TIE PV SYSTEM.

Draw a fully labelled block diagram of a GRID TIE PV reticulation system.

The drawing must include the following:

- Power plant
- Transmission Line (HT)
- Substation
- Low voltage
- Meter
- AC breaker panel (DB Board)
- Grid tie inverter
- Solar panels (PV panels)
- Arrows to show current flow

NOTE:
A block diagram is a diagram of a system in which the principal parts or functions are represented by blocks connected by lines that show the relationships of the blocks. **[20]**

QUESTION 4: ELECTRICAL MOTORS AND CONTROL DEVICES

FIGURE 3 on the DIAGRAM SHEET (attached) is a picture of a 3-phase wiring diagram for the main supply distribution board of a building. The circuit shown is used to check/test the main voltage and the current of the supply.

Redraw the complete circuit and improve the circuit layout where possible.

Draw the main (power) circuit and the testing circuit together (as given) and improve/ complete the item designation so that the final drawing will be ready for reproduction. **[20]**

QUESTION 5: WIRING OF PREMISES

FIGURE 4 on the DIAGRAM SHEET (attached) represents a schematic layout of three single-phase distribution boards for a typical building.

Make use of the given layout and draw a fully labelled electrical diagram of a single-phase distribution board by interconnecting the necessary graphical symbols.

Add all required circuit breaker ratings and wire sizes to the drawing.

No names for any of the sub-circuits (e.g., stove, lights, etc.) need to be shown.

A legend must accompany the drawing to declare all graphical symbols. **[20]**

TOTAL: 100

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DIAGRAM SHEET

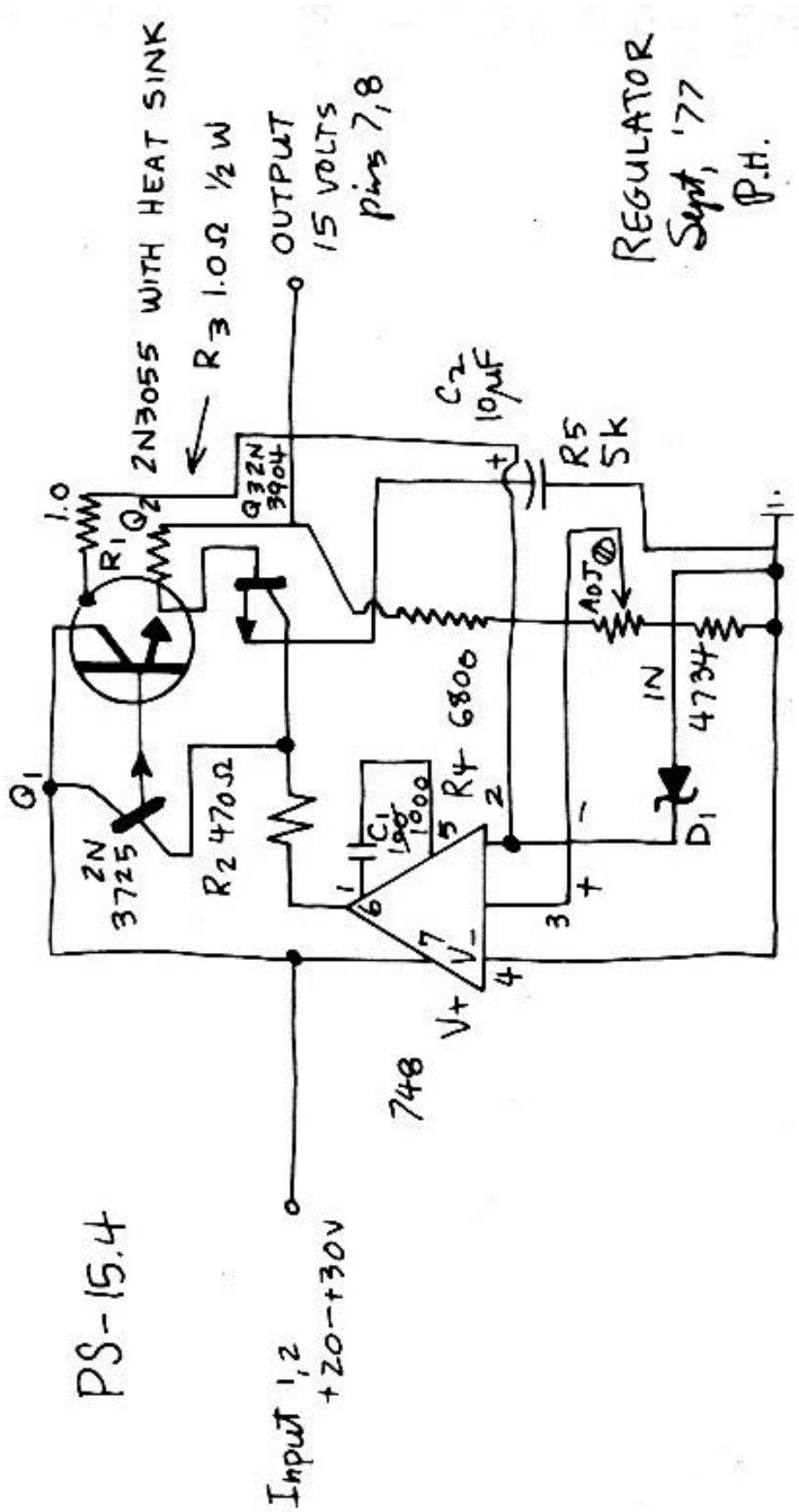


FIGURE 1

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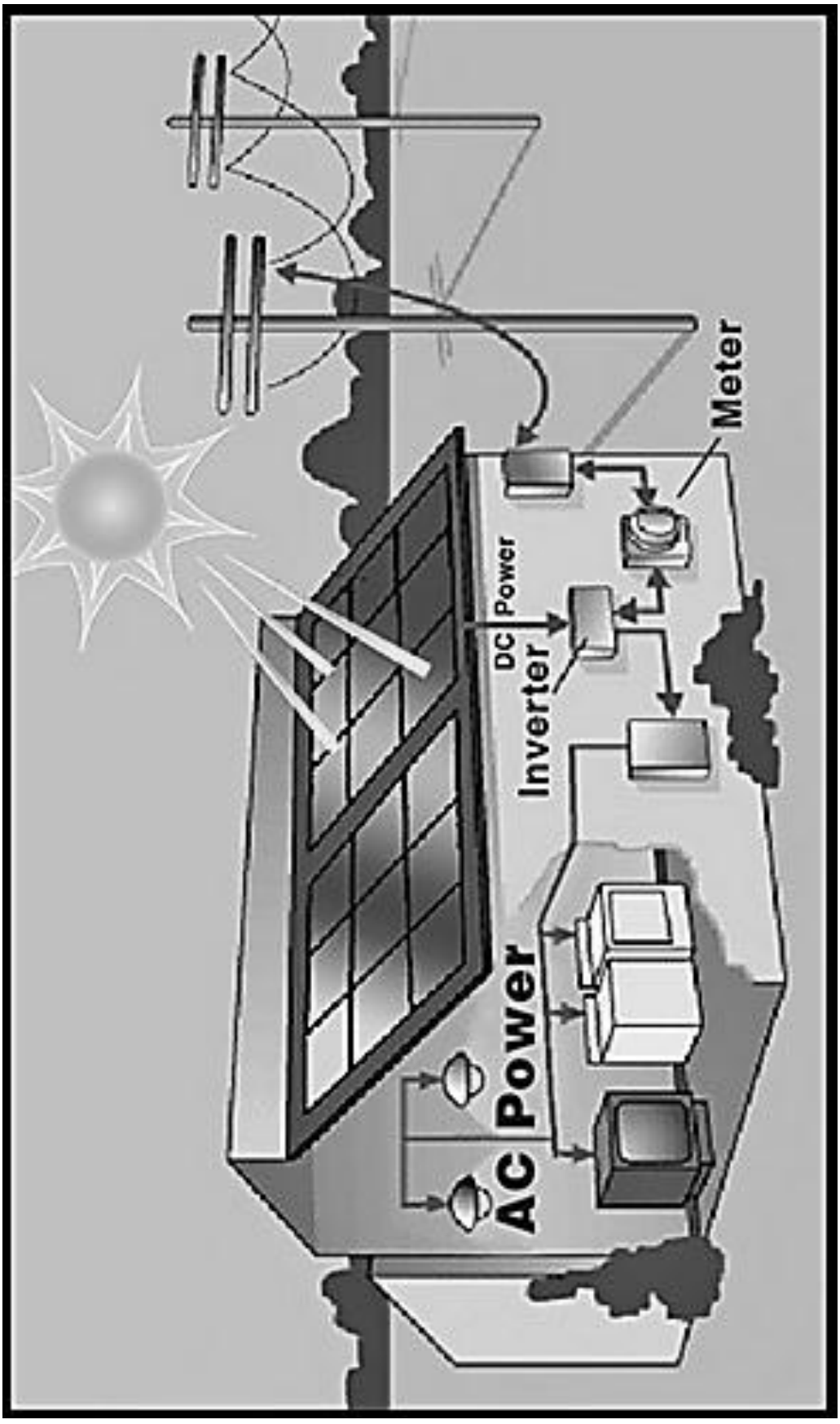


FIGURE 2

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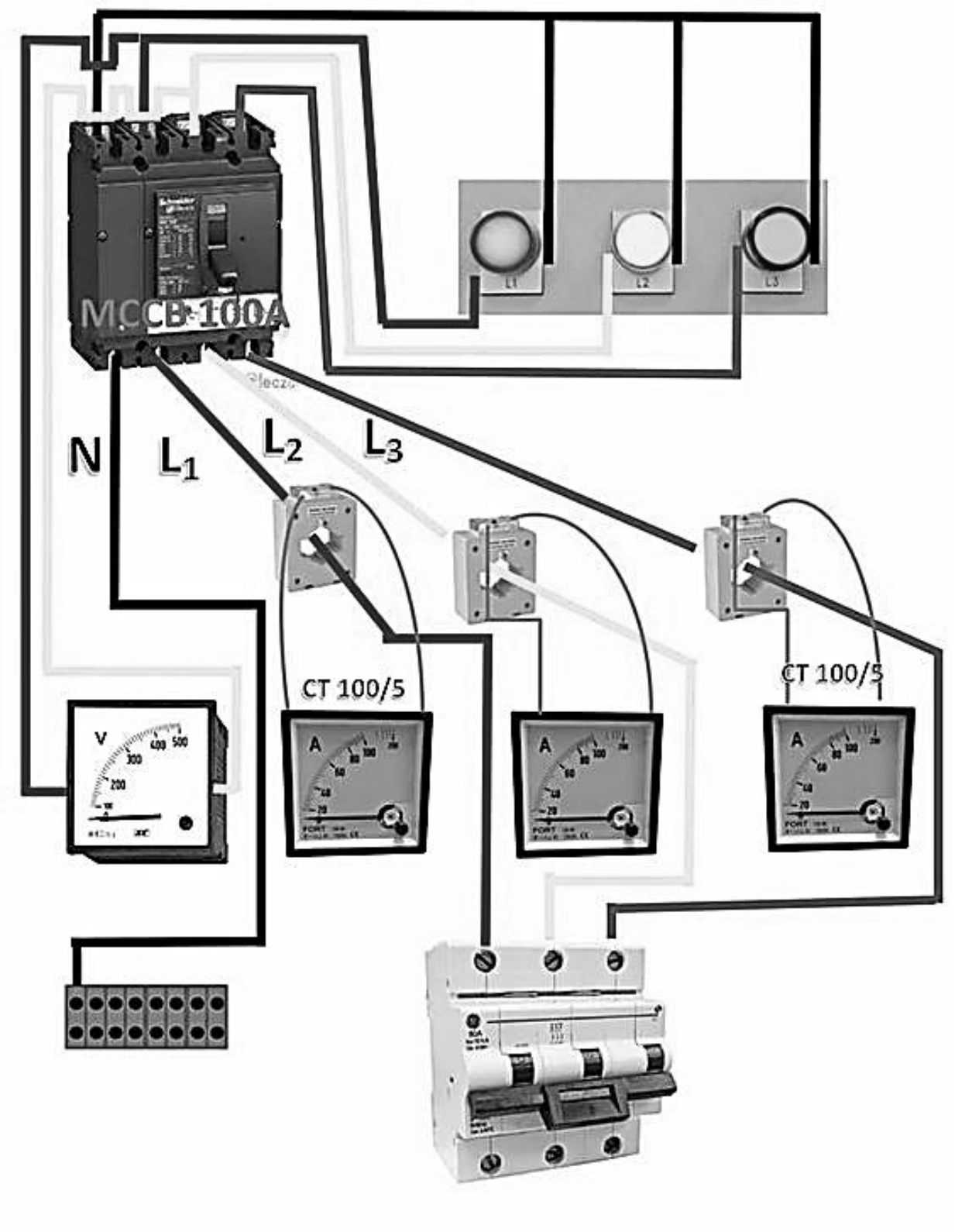


FIGURE 3

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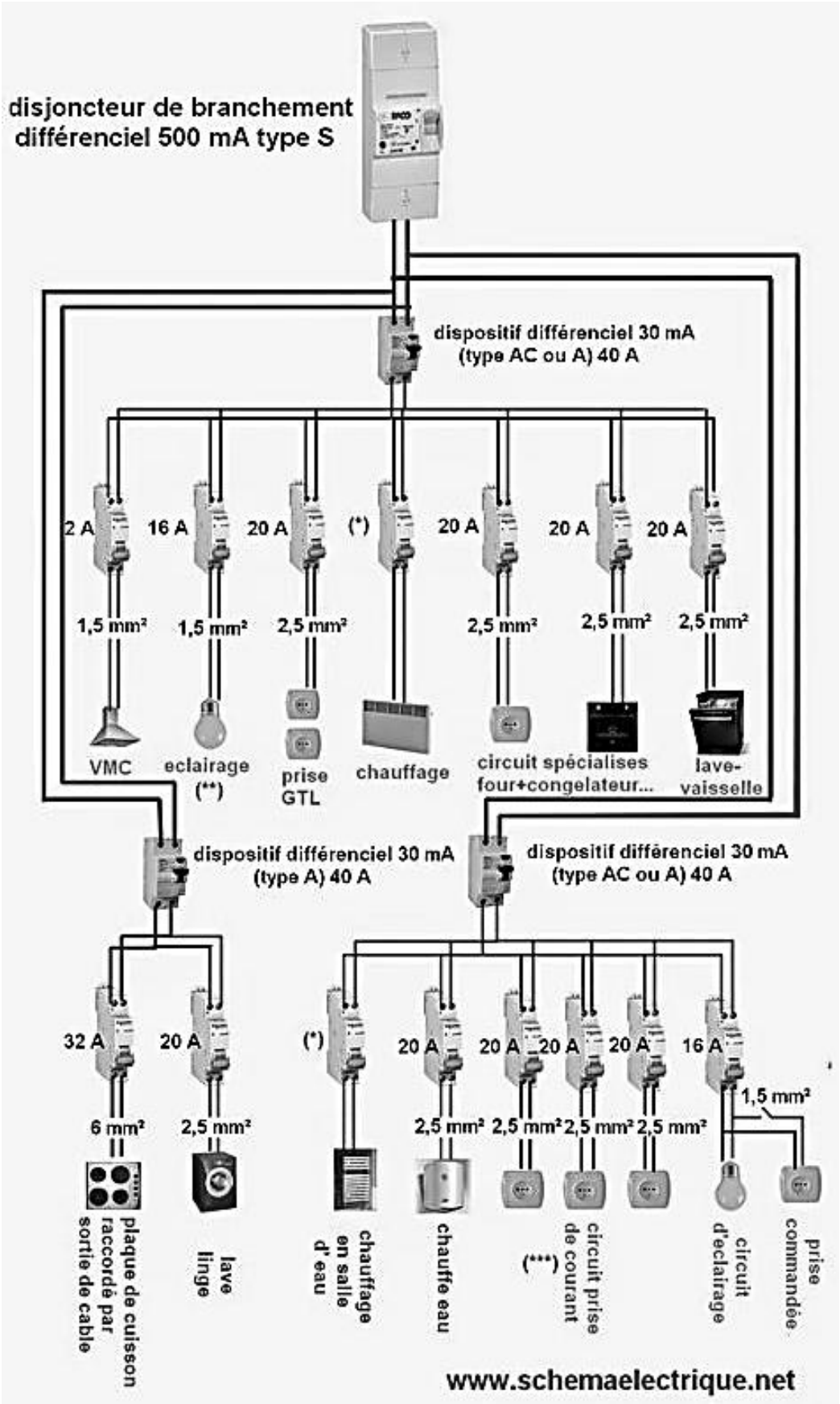


FIGURE 4

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