higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

MULTI-DISCIPLINARY DRAWING OFFICE PRACTICE: ELECTRICAL DRAUGHTING

(8080625)

2 December 2022 (X-paper)
09:00–13:00

REQUIREMENTS: **A4 drawing sheets.**
Computer-aided draughting equipment and related software may be used.

Drawing instruments and nonprogrammable calculators may be used.

This question paper consists of 5 pages and 4 diagram sheets.

318Q1E2202

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
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NATIONAL CERTIFICATE
MULTI-DISCIPLINARY DRAWING OFFICE PRACTICE:
ELECTRICAL DRAUGHTING
TIME: 4 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Read all the questions carefully.

2. Answer ALL the questions (theory and drawings) on drawing paper (no separate ANSWER BOOK is required for answering any of the questions).

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

4. Marks will be allocated for:

   4.1 Balanced layout and size
   4.2 Correctness
   4.3 Lettering
   4.4 Linework and neatness

5. Write neatly and legibly.

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QUESTION 1: GENERAL THEORY

1.1 Complete the following table by writing only the missing electrical terms next to the question number (1.1.1–1.1.6) on the DRAWING SHEET.

QUANTITY	UNIT	UNIT SYMBOL
Capacitance	(1.1.1) …	(1.1.2) …
Impedance	(1.1.3) …	(1.1.4) …
Luminance	(1.1.5) …	(1.1.6) …

(6)

1.2 What are the TWO types of current electricity? (1)

1.3 List THREE sources of electricity. (3)

1.4 Three 220 V LED spotlights of 9 W each are connected in series to an AC single-phase 220 V supply.

Draw the circuit and calculate the following by writing the correct answer next to the question number (1.4.1–1.4.5) on the DRAWING SHEET. Show all calculations.

Use the appropriate symbols and unit symbols in each case, for example:

⊗ = LED lamp

V = Volt
W = Watt (3)

1.4.1 Total electrical power consumption (watts) (1)

1.4.2 Electrical current through each lamp (amperes) (1)

1.4.3 Volt drop across each lamp (volts) (1)

1.4.4 Resistance per lamp (ohms) (2)

1.4.5 Total resistance of lamps (ohms) (2)

[20]

QUESTION 2: GRAPHICAL SYMBOLS AND ELECTRONIC DIAGRAMS

FIGURE 1 on DIAGRAM SHEET 1 shows an incomplete table of electronic component names, symbols, pictures and other information.

Complete the table by writing/drawing only the missing information next to the question number (2.1–2.8) in the ANSWER BOOK..

Do not redraw the table; only give the missing information and/or symbol.

2.1	Draw the symbol for the associated component.	(2)
2.2	Write the value of the resistor with the following colour band: Red; red; blue; silver	(4)
2.3	Draw the colour band of the resistor with the following value: 52 kΩ 5%.	(4)
2.4	Write the name of the given picture and associated symbol.	(2)
2.5	Draw the symbol for the associated component.	(2)
2.6	Write the name of the given picture and associated symbol.	(2)
2.7	2.7.1 Write the name of the component of the given picture.	(1)
	2.7.2 Write the values of the component.	(1)
2.8	Write the name of the given picture and associated symbol.	(2)

[20]

QUESTION 3: GENERATION AND DISTRIBUTION OF ELECTRICITY

FIGURE 2 on DIAGRAM SHEET 2 shows an exploded isometric view of two 50 × 7,5 mm copper busbars and two 75 × 80 × 10 mm copper connection plates.

You are required to draw an assembly front view and top view in first-angle orthographic projection, with the four M10 × 50 mm bolts and M10 nuts in place.

Dimension the following:

- The connector plate – length, width and height
- The centre lines of the holes for the bolts and nuts
- The distance between the two busbars
- The overall height of the connection

Label the different components.

Show hidden detail only on the top view to show the distance between the busbars. **[20]**

QUESTION 4: ELECTRICAL MOTORS AND CONTROL DEVICES

FIGURE 3 on DIAGRAM SHEET 3 is a wiring diagram for a forward-reverse type starter to control an electrical three-phase motor.

Draw the wiring diagram of the main (power) circuit and the control circuit separately 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 DIAGRAM SHEET 4 is a sketch of an internet café with nine computer stations.

Draw a plan elevation of this room and make provision for the following points:

- 6 × LED down-light fittings on ceiling, connected to a dimmer switch
- 2 × LED tube lights on ceiling, connected to a switch
- 9 × socket outlets – one at each computer station
- 9 × data outlet points – one at each computer station
- Electrical distribution board

A detailed drawing of the building is not required.

Add ALL electrical points necessary for this type of room on the plan, taking into account all applicable regulations in the SANS 10142 national code of conduct for the wiring of premises.

The drawing must be accompanied by a legend (key) of the electrical installation symbols. **[20]**

TOTAL: 100

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DIAGRAM SHEET 1

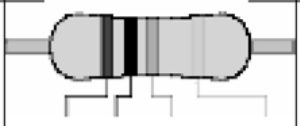
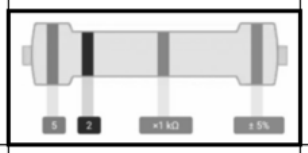
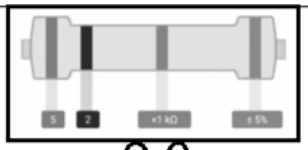
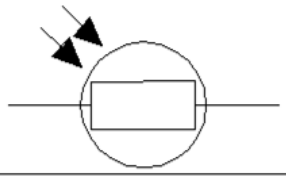
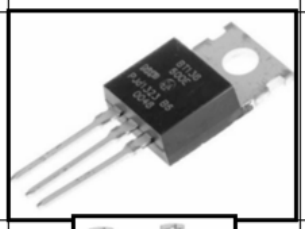
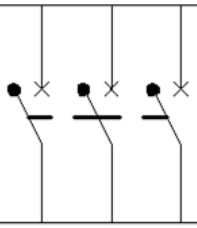
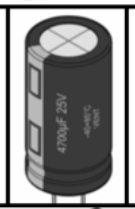
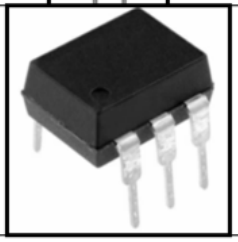
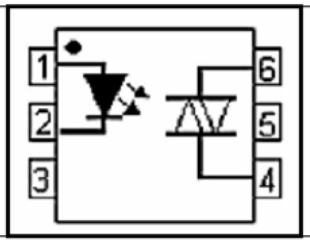
MULTI TURN POTENTIOMETER		2.1
RESISTOR		2.2
RESISTOR	52KΩ 5% 	 2.3
2.4		
TRIAC		2.5
2.6		
2.7.1		2.7.2
2.8		

FIGURE 1

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DIAGRAM SHEET 2

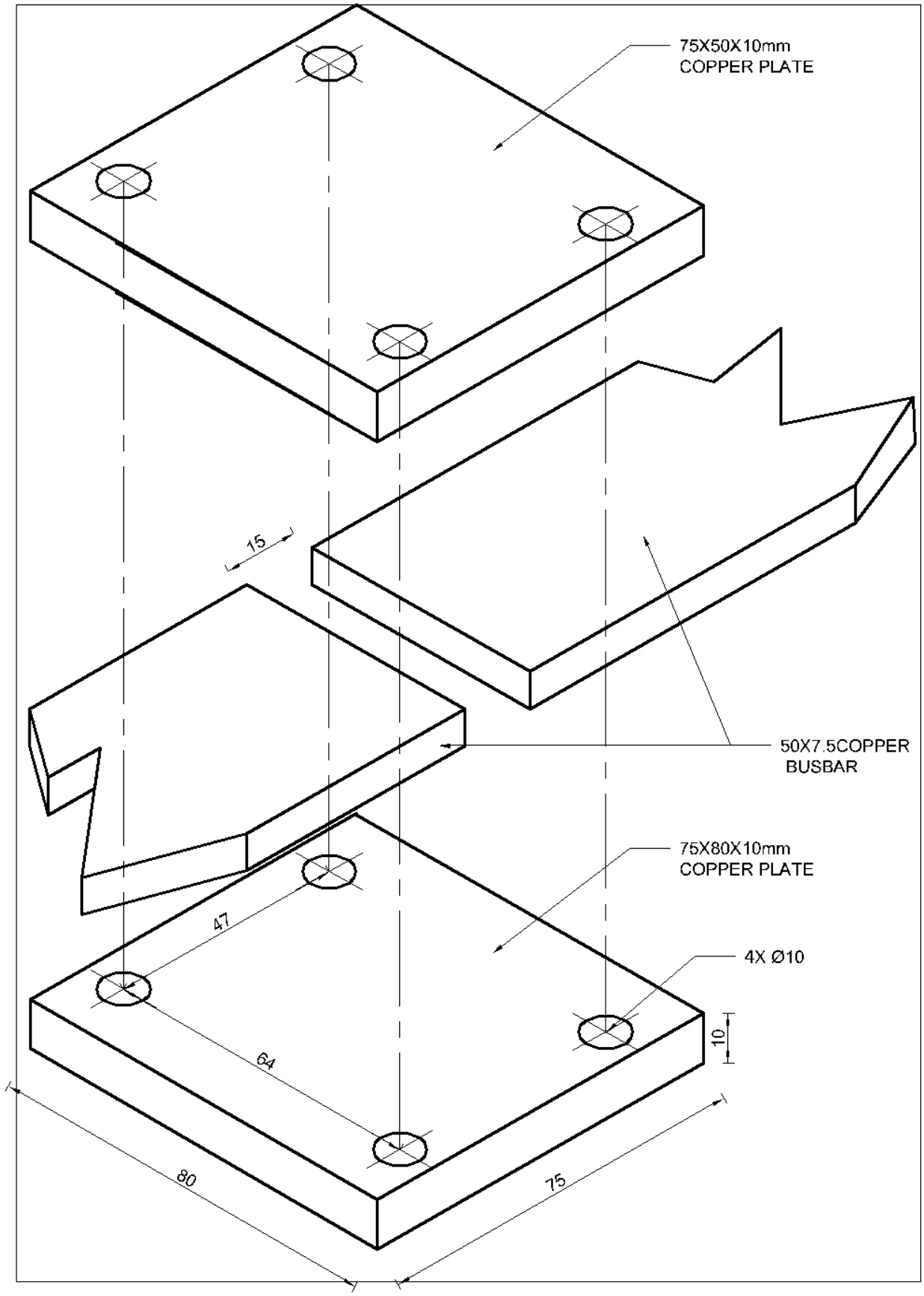


FIGURE 2

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DIAGRAM SHEET 3

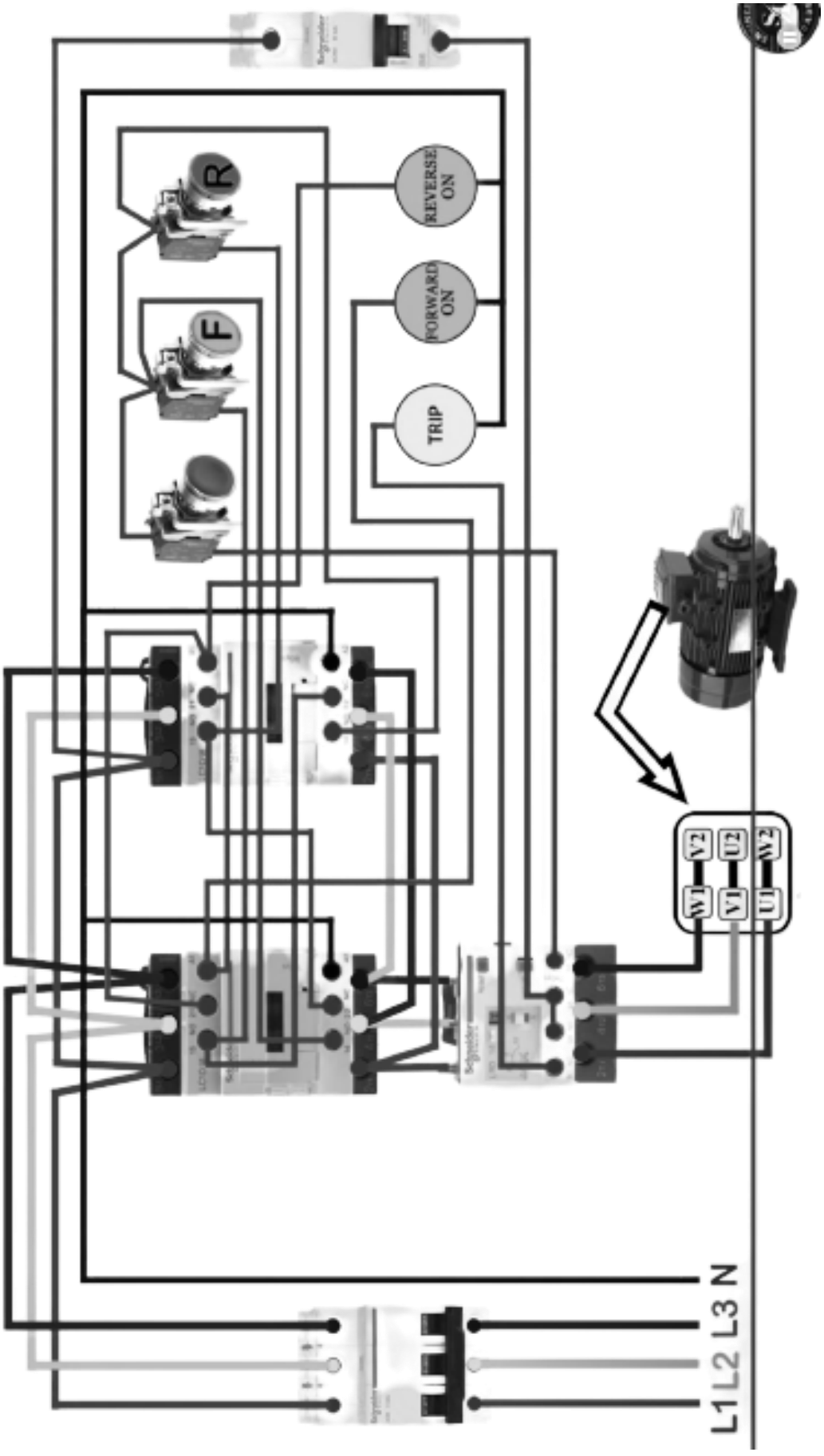


FIGURE 3

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DIAGRAM SHEET 4

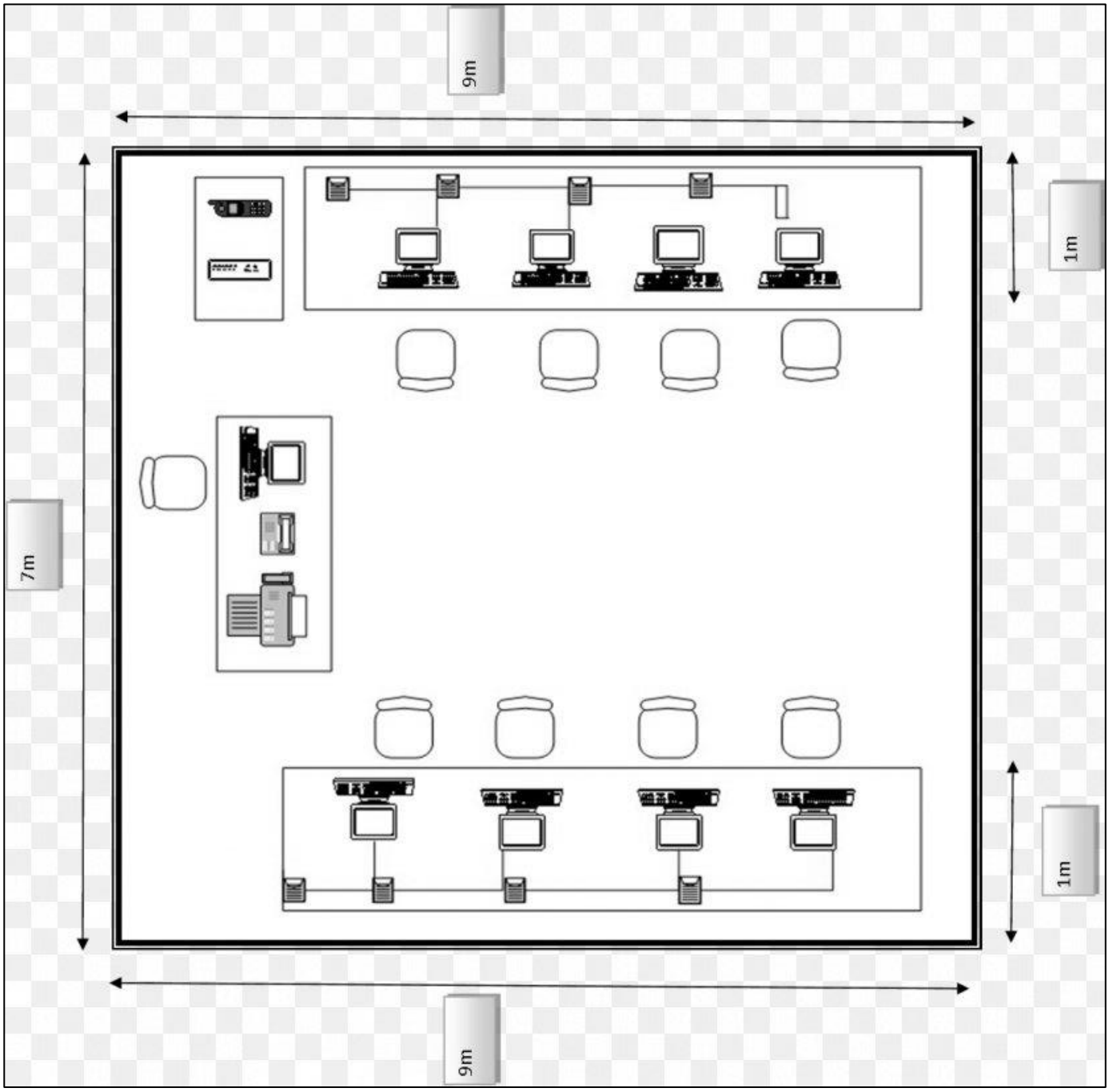


FIGURE 4

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