higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

MULTI-DISCIPLINARY DRAWING OFFICE PRACTICE: ELECTRICAL DRAUGHTING

(8080625)

23 April 2021 (X-paper)
09:00–13:00

REQUIREMENTS: Drawing paper, a calculator and drawing instruments

Computer-aided drawing software and/or drawing equipment may be used.

This question paper consists of 4 pages and 3 diagram sheets.

311Q1A2123

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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 Line work and neatness

5. Write neatly and legibly.

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QUESTION 1: GENERAL THEORY

1.1 You are involved in the calculation of the total required flux for a new training room.

The following data are available:

Recommended illuminance	30 lm/m²
Coefficient of utilisation	0,54
Lamp lumen depreciation	0,8
Maintenance factor	0,8
Length of the room	20 m
Width of the room	14 m

Use the given information and calculate the total required flux for the new office and also state the unit of the answer.

HINT: Total required flux: $\Phi = \frac{E_{av} \times A}{M \times CU \times LLD}$ (5)

1.2 State TWO general uses for each of the following electronic components:

1.2.1 Diode

1.2.2 Transistor

1.2.3 Resistor

1.2.4 Capacitor

1.2.5 Battery

(5 × 2) (10)

1.3 Choose the correct word(s) from those given in brackets. Write only the word(s) next to the question number (1.3.1–1.3.2) on the DRAWING SHEET.

1.3.1 SANS (0144/1994/10400XA/6170/10142) is the South African national code of conduct for the wiring of premises.

1.3.2 The prefix (nano/femto/giga/pico/atto) means: $x10^{-9}$

(2 × 1) (2)

1.4 Explain the meaning of the term *negative temperature coefficient of resistance* and name ONE material which has a negative temperature coefficient of resistance. (3)

[20]

QUESTION 2: GRAPHICAL SYMBOLS AND ELECTRONIC DIAGRAMS

DIAGRAM SHEET 1 (attached), represents the circuit diagram of an ultrasonic cleaner, with the omission of the semi-contactor components and voltage regulator symbols.

Draw the circuit diagram with the correct graphical IEC symbols of all the components and ONLY label the programmable integrated circuit (PIC), the semi-contactor components and the voltage regulator so that the completed drawing will be ready for reproduction. **[20]**

QUESTION 3: GENERATION AND DISTRIBUTION OF ELECTRICITY

DIAGRAM SHEET 2 (attached), represents an isometric drawing of an isolation transformer (ratio 1:1).

Draw a fully labelled ISOMETRIC DRAWING of a step-up and step-down transformer. Use the same drawing method and labelling as in FIGURE 2. **[20]**

QUESTION 4: ELECTRICAL MOTORS AND CONTROL DEVICES

DIAGRAM SHEET 3 (attached), shows a sectional isometric view of a typical squirrel cage rotor. Draw an elevation plan with the top half in section and a side view (end view).

Use a proper scale. **[20]**

QUESTION 5: WIRING OF PREMISES

Draw a plan elevation of a domestic installation and make provision for at least:

- Living room
- Dining room
- Passage
- Minimum TWO bedrooms
- Bathroom and toilet
- Single garage separated from the house and with a sub-distribution board

A detailed drawing of the building is not required.

Add all electrical points, lighting, exterior spot light/s, with switch/es necessary for this type of building on the plan, considering all applicable regulations in the SANS 10142 national code 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

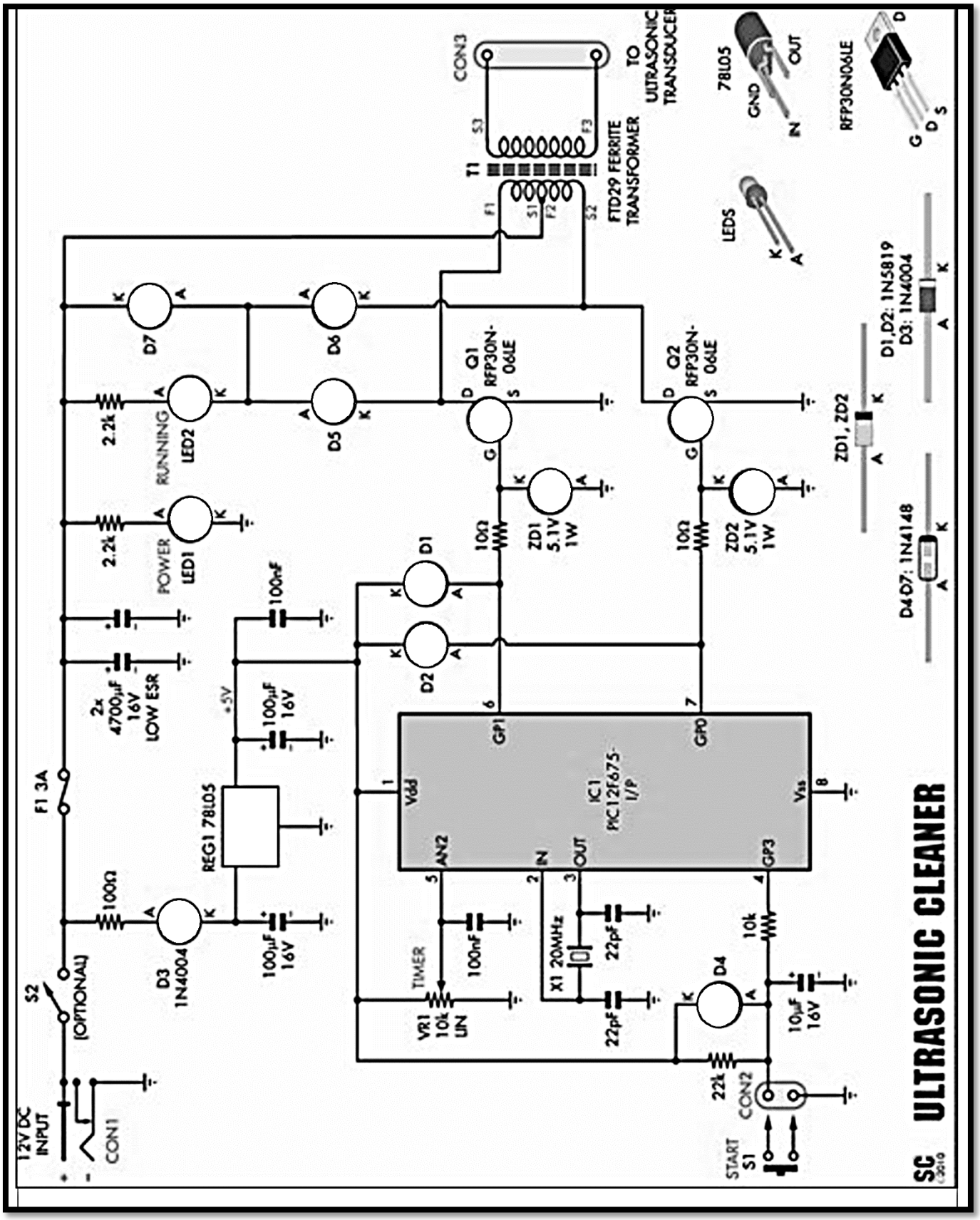
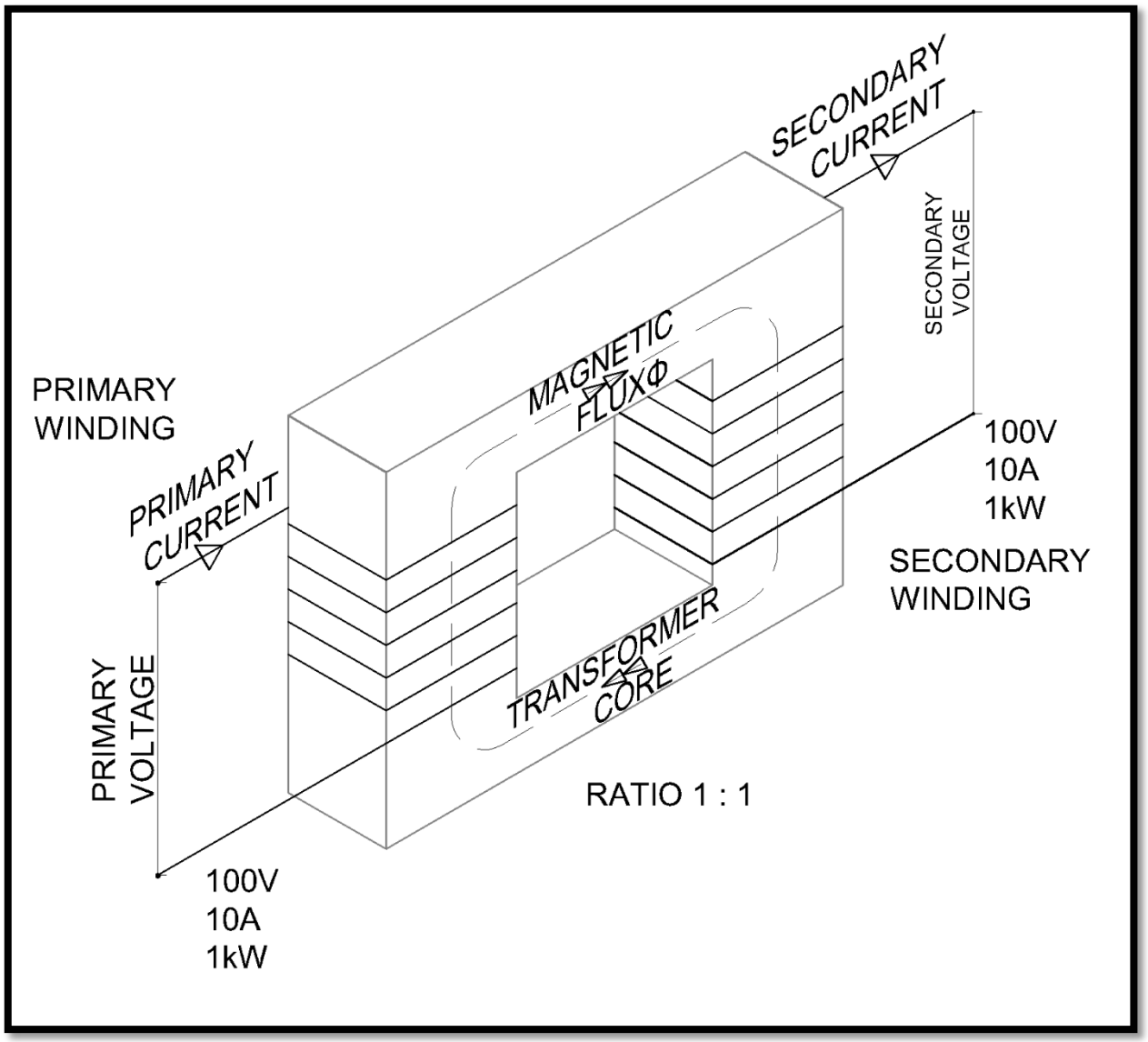
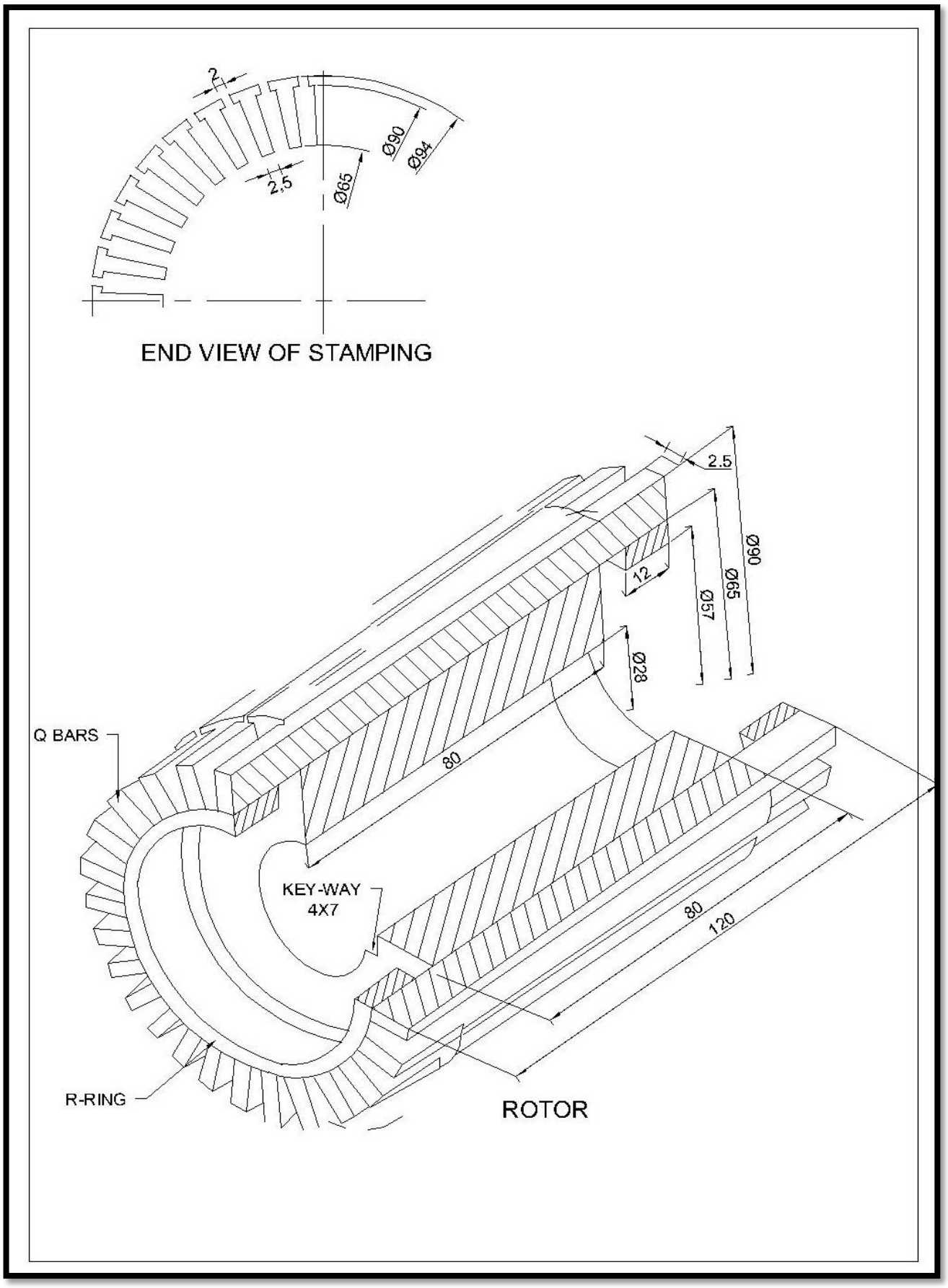


DIAGRAM SHEET 2



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DIAGRAM SHEET 3



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