higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T490**(E)**(A13)T

# NATIONAL CERTIFICATE

# MULTI-DISCIPLINARY DRAWING OFFICE PRACTICE: ELECTRICAL DRAUGHTING

(8080625)

**13 April 2018 (X-Paper)**
**09:00–13:00**

**REQUIREMENTS:** **Drawing sheets**

**Calculators, drawing instruments, CAD equipment and related software may be used.**

**This question paper consists of 6 pages and 1 diagram sheet.**

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# DEPARTMENT OF HIGHER EDUCATION AND TRAINING
# REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
MULTI-DISCIPLINARY DRAWING OFFICE PRACTICE:
ELECTRICAL DRAUGHTING
TIME: 4 HOURS
MARKS: 100

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**INSTRUCTIONS AND INFORMATION**

1. Answer ALL the questions (theory and drawings) on DRAWING SHEETS (NO ANSWER BOOK is required for answering 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:

   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 must calculate the total flux required for a new training room.

The following data is available:

| | |
|---|---|
| Recommended illuminance | 500 lm/m² |
| Coefficient of utilisation | 0,54 |
| Lamp lumen depreciation | 0,8 |
| Maintenance factor | 0,8 |
| Length of the room | 10 m |
| Width of the room | 7 m |

Use the information provided to calculate the total required flux and give the correct SI unit.

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

1.2 Give the conductor diameters ($mm^2$) prescribed for each of the following circuits or subcircuits as used for the wiring of premises:

1.2.1 Main supply

1.2.2 Cooking appliance (electrical stove)

1.2.3 Geyser

1.2.4 Socket outlet (power outlet)

1.2.5 Illumination

(5 × 1) (5)

**[10]**

## QUESTION 2: GRAPHICAL SYMBOLS AND ELECTRONIC DIAGRAMS

Graphical representations of electronic components are shown below.

Name and draw the correct and complete graphical symbol for each of the following electronic components. Write the answer next to the question number (2.1–2.15) in the ANSWER BOOK. Use only IEC symbols.

2.1



2.2



2.3



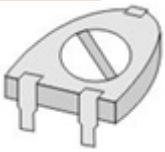
2.4



2.5



2.6



2.7



2.8




2.9



2.10



2.11



2.12



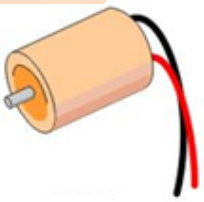
2.13



2.14



2.15



[Source: *http://www.technologystudent.com/*]

(15 × 2) **[30]**

## QUESTION 3: GENERATION AND DISTRIBUTION OF ELECTRICITY

The FIGURE on the DIAGRAM SHEET (attached) shows a half-sectional front view of a porcelain insulator and an outside view of a single LT tubular cross-arm with an M12 stud, a 30 × 30 × 5 mm square washer, a spring washer and an M12 nut.

Draw a full-sectional front view of the assembly of ALL the components above to show how the insulator is attached to the LT tubular cross-arm. Label only the different components. **[25]**

## QUESTION 4: ELECTRICAL MOTORS AND CONTROL DEVICES

The outer stationary part of an alternating current (AC) induction motor is known as a stator and the inner rotating part is known as a rotor. The most basic type of rotor is known as a squirrel-cage rotor due to its simple construction.

Use drawing instruments to draw a neat, labelled drawing of a basic squirrel-cage rotor. Clearly show the construction of the shaft, the laminated core plates and the skewed slots. **[15]**

## QUESTION 5: WIRING OF PREMISES

Draw a plan elevation of a domestic installation and include the following:

- 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.

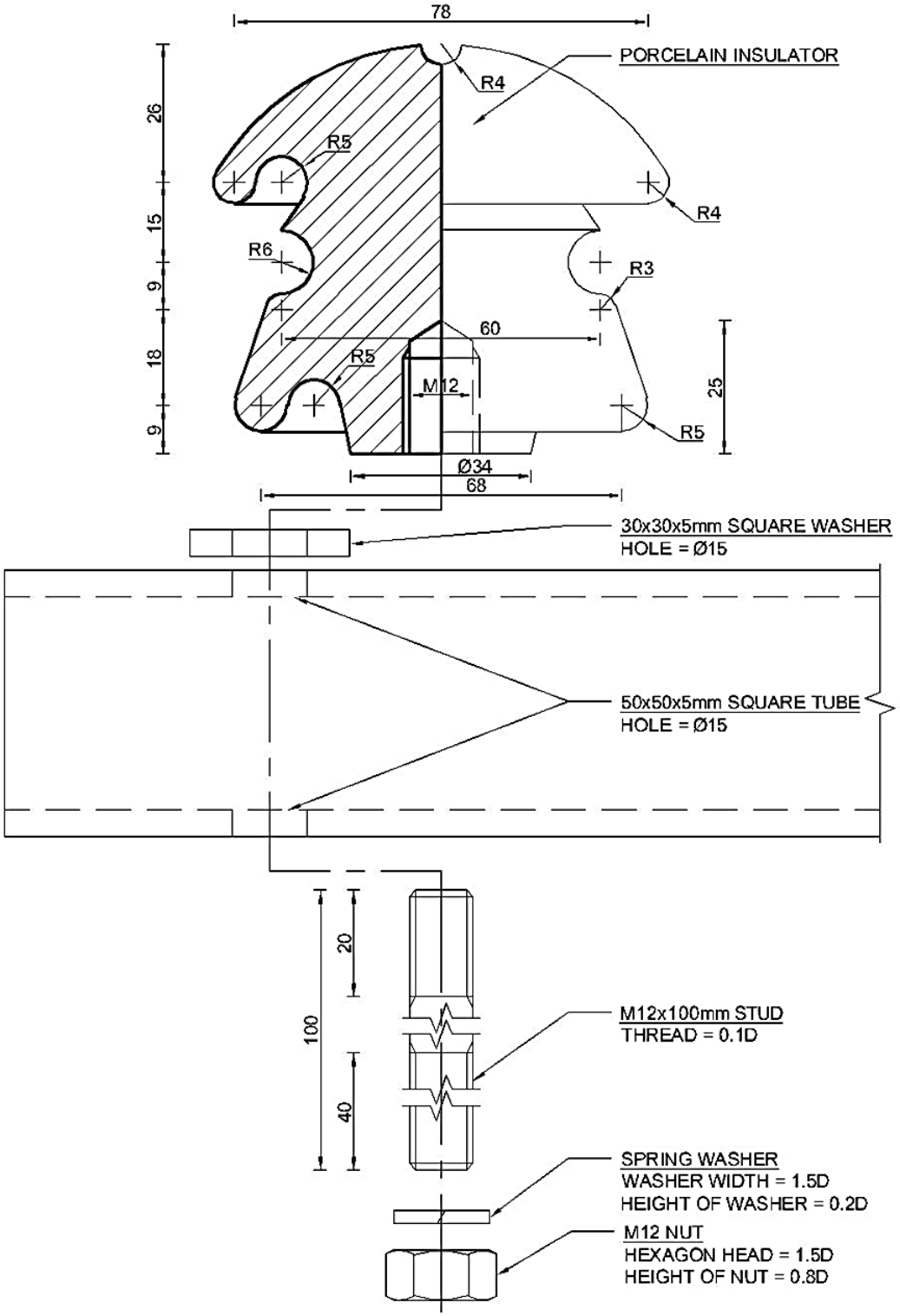
Add ALL electrical points, lighting and exterior spotlight or lights with a switch or switches necessary for this type of building on the plan. Take into account ALL applicable regulations in the SANS 10142 National Code of Conduct for the Wiring of Premises.

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

**TOTAL: 100**

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## DIAGRAM SHEET




**FIGURE**

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