UNIVERSITY OF JOHANNESBURG

FACULTY : EDUCATION

DEPARTMENT : SCIENCE AND TECHNOLOGY EDUCATION

CAMPUS : APK

MODULE : ENGINEERING GRAPHICS AND TECHNOLOGY EDUCATION 3A (EGD10A3)

SEMESTER : First

EXAM : SSA July 2019

ASSESSOR(S) : MR W ENGELBRECHT

MODERATOR : DR W RAUSCHER (UP)

DURATION : 2 HOURS **MARKS** : 100

NUMBER OF PAGES: 5 PAGES

INSTRUCTIONS:

1. Answer ALL THE QUESTIONS.
2. Number your answers clearly.

QUESTION 1

Design and draw a circuit diagram by using all the components listed below. The total current in the circuit must be **9.31mA**. Show all calculations.

You have the following components at your disposal:

Components	**Quantity**
AA penlight cells	6
A resistor with the following colour bands: brown, black, red, red.	1
A resistor with the following colour bands: red, black, red, red.	1
A resistor with the following colour bands: orange, black, brown, red.	1

[16]

QUESTION 2

2.1 If you had to design a power tool such as a portable grinder, without an earth connector in the electric plug, briefly explain what kind of switch you would use to safely control the machine as well as the reasons for this decision.

(5)

2.2 Explain how a reed switch works, and give a typical application thereof.

(4)

2.3 You need to change the direction of an electric DC motor's rotation using a switch. Draw the diagram of a circuit that would make this possible, including the battery, the appropriate switch and the motor. **(6)**

2.4 Draw the symbol for an **OR** gate and compile a truth table for **three** inputs it.

(8)

2.5 Briefly describe and discuss a possible practical application for the gate in 2.4.

(3)

[26]

QUESTION 3

3.1 A client has a need for a device that would automatically switch on a wall mounted panel heater powered by mains electricity when the ambient temperature falls to a pre-set level (when it gets cold). Design and draw the diagram for the electronic circuit for such a device. You have the following components at your disposal:

Components	**Quantity**
9V battery	1
Single pole single throw switch	1
BC547 NPN transistor	1
47kΩ resistor	1
2.2kΩ resistor	3
680Ω resistor	1
100kΩ potentiometer	1
Red LED	1
LDR	1
Thermistor	1
9V relay	1
Connecting wire	500mm
Mains powered panel heater	1

(20)

3.2 Briefly describe how the circuit you designed in 3.1 works by referring to the function of the various components you used. **(10)**

[30]

QUESTION 4

Figure 1 shows the floorplan of a house. Complete the worksheet by adding the electrical fittings as listed next to Figure 1. Use SABS 0143 electrical symbols and show connections where required. **Detach the worksheet from the question paper and place it inside your answer book.**

Electrical fittings:

1. Distribution board
2. Switch socket outlet
3. Two-pole light switch
4. Single-pole light switch
5. Ceiling light
6. 2 x 40W fluorescent tubes

NOTE:

The arrow shows the light connection to the switch

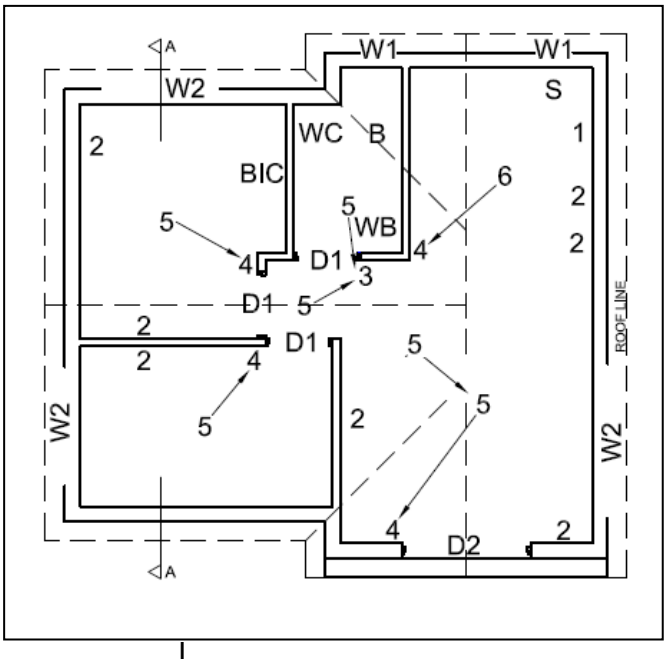

Figure 1

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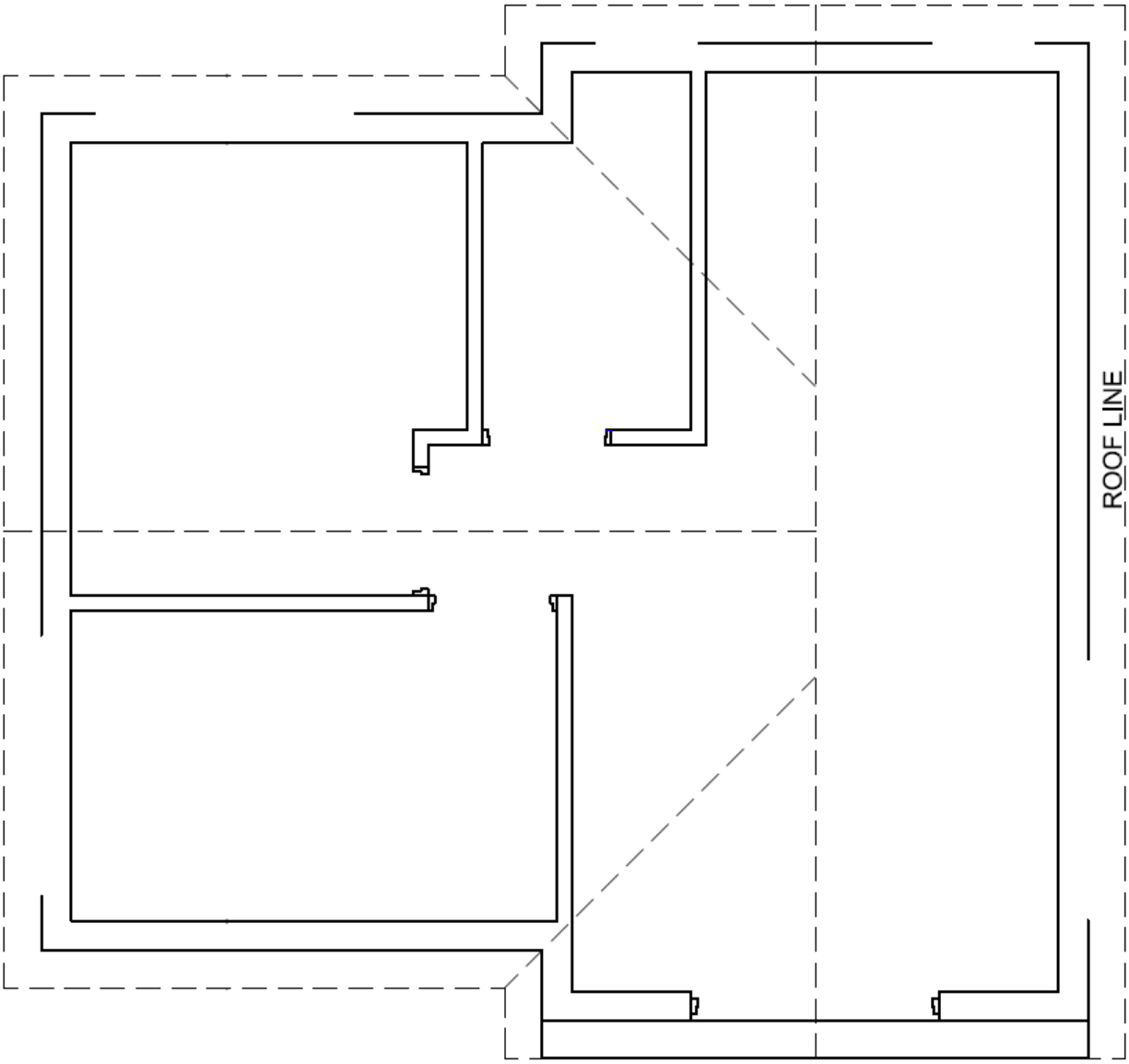
TOTAL: 100

Question 4: Worksheet

Name: _____

Student Number: _____



Work sheet