



UNIVERSITY OF JOHANNESBURG
FACULTY OF EDUCATION
JUNE EXAMINATION 2015

PROGRAMME: B Ed (SENIOR AND FET PHASE)
MODULE: ENGINEERING GRAPHICS AND TECHNOLOGY EDUCATION
 3A
CODE: EGD10A3
TIME: 2 Hours
MARKS: 100
EXAMINER: Mr W Engelbrecht
MODERATOR: Dr W Rauscher (UP)
 (This paper consists of 3 pages)

INSTRUCTIONS:

Read the following instructions carefully before answering the questions:

1. Answer all the questions.
2. Questions may be answered in English or Afrikaans.

QUESTION 1

You have the following components at your disposal:

Components	Quantity
AA penlight cells	4
A resistor with the following colour bands: brown, black, black, red.	1
A resistor with the following colour bands: red, black, black, red.	1
A resistor with the following colour bands: orange, black, black, red.	1

Design and draw a circuit diagram where you use all the above components and where the total current in the circuit will be **136mA**. Show all calculations. (16)

QUESTION 2

- 2.1 If you had to design a hand tool such as a drilling machine, without an earth connector in the electric plug, briefly explain what kind of switch you would use to safely control the machine and the reasons for this decision. (3)

- 2.2 Explain how a reed switch works, and describe a typical application thereof. (5)
- 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 You have to switch a machine on and off by using a relay and two push-button switches (the one a normally open, the other a normally closed). Momentarily pushing the one push button switch should start the machine and it should keep on running until the other switch is pushed momentarily, which will stop the machine. Sketch the diagram of such a circuit and briefly explain how it works. (10)
- (24)**

QUESTION 3

- 3.1 You have a need for a device that could give you a visible indication when it is necessary to water your pot plant. Design and draw the diagram for the electronic circuit for such a device. You have the following components at your disposal: (20)

Components	Quantity
9V battery	1
Single pole single throw switch	1
BC547 NPN transistor	1
47k Ω resistor	1
1k Ω resistor	3
680 Ω resistor	1
100k Ω potentiometer	1
Red LED	1
LDR	1
Thermistor	1
Connecting wire	50cm

- 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)

QUESTION 4

There are 15 deliberate electrical errors and/or omissions in Figure 1. Identify the mistakes and/or omissions by placing a neat freehand circle around each of them. Then correct the mistake by drawing it the way it should be drawn on Figure 2. Detach the worksheet from the question paper and place it inside your answer book (30)

TOTAL: 100

Question 4 Worksheet

Name: _____

Student Number: _____

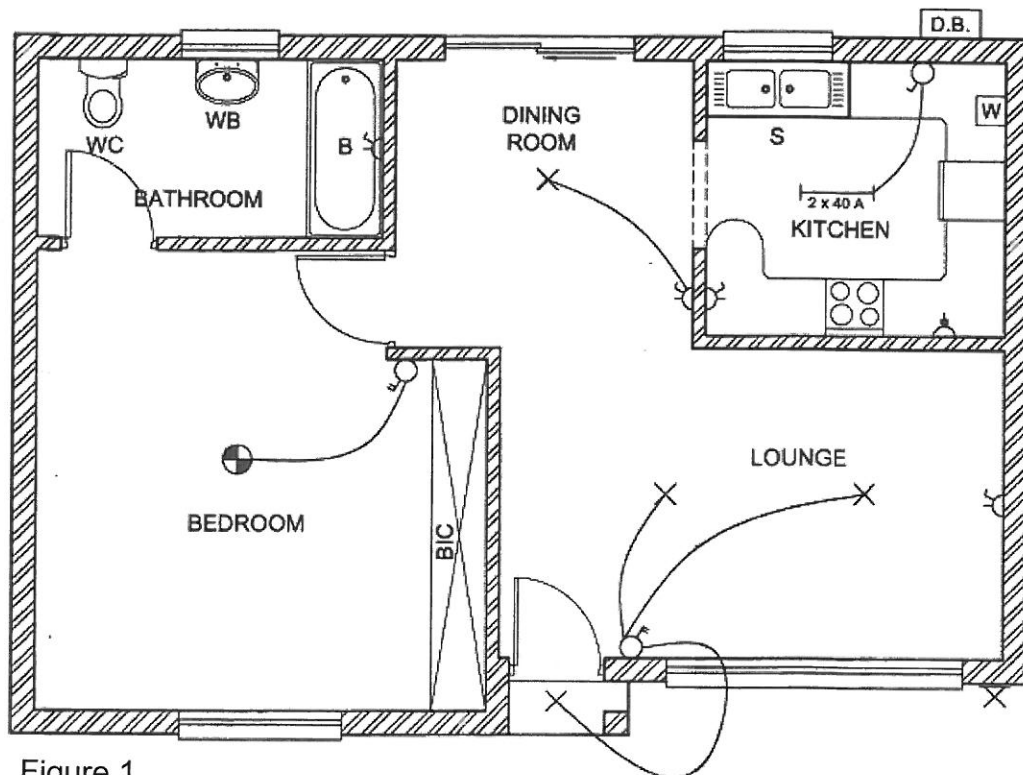


Figure 1

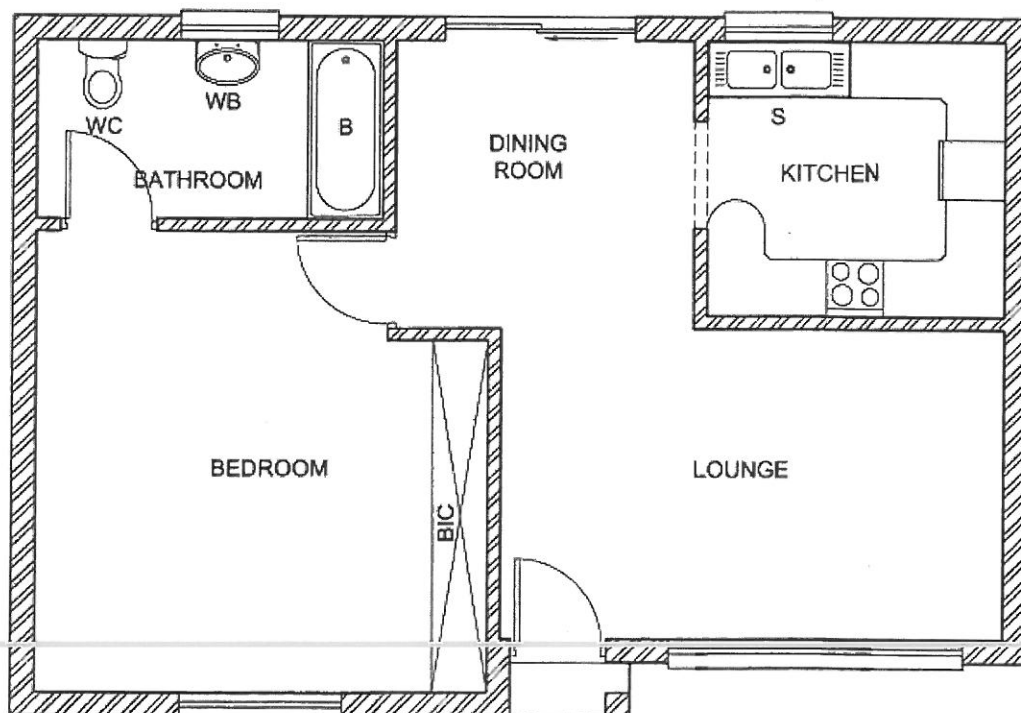


Figure 2