UNIVERSITY OF SWAZILAND

FACULTY OF EDUCATION

SEMESTER 2 EXAMINATION PAPER 2010

PGCE Full Time / B Ed

TITLE OF PAPER: Curriculum Studies in Physics

COURSE NUMBER: EDC 382

TIME ALLOWED Three (3) hours

INSTRUCTIONS

1. This paper contains FIVE questions
2. Question 1 is COMPULSORY. You may then choose ANY THREE questions from questions 2, 3, 4, 5
3. Question1 is 40 marks and Question2-5 are worth 20 marks each.
4. Any piece of material or work which is **not** intended for marking purposes should be clearly CROSSED OUT
5. Ensure that responses to questions are NUMBERED CORRECTLY

SPECIAL REQUIREMENTS: **Graph pad.**

THIS PAPER SHOULD NOT BE OPENED UNTIL PERMISSION HAS BEEN GRANTED BY THE INVIGILATOR

Question 1 Compulsory [40 marks]

A student wishes to investigate how the resistance *R* of a light-dependent resistor varies with the distance *d* from an intense light source.

It is believed that the relationship between *R* and *d* is

$$R = kd^n$$ where *k* and *n* are constants.

The light-dependent resistor has a resistance of 100Ω when it is in bright light and a resistance of 500 kΩ when no light falls on it.

Design a laboratory experiment **to test the above relationship**. You should draw a diagram showing the arrangement of your equipment and any precautionary measures you take to maintain exact alignment of the apparatus. [Labeled diagram 5]

In your account you should pay particular attention to

a) defining the variables in the problem, [5]

b) the procedure to be followed, [5]

c) he measurements that would be taken, [5]

d) the control of variables, [5]

e) how the data would be analysed, [5]

f) any safety precautions that you would take. [5]

g) Given a class of 40 students and 5 light dependent resistors, how would you teach this investigative skill practically? [5]

Question 2 [20 marks]

The ability of a mercury-in-glass thermometer to detect rapidly changing temperatures is compared with the platinum-resistance thermometer.

a) Explain how the Zeroth Law of thermodynamics is the basis of thermometry. [5]

b) Draw a setup that could be used to measure the cooling of a liquid from a temperature of 100^0C to room temperature with the two different thermometers to compare the two.[6]

c) The mass of H_2 molecule is $3.3 \times 10^{-24} g$. If 10^{23} H_2 molecules strike 2.0cm^2 of wall at an angle of 55^0 with the normal when moving with a speed 1.0×10^5 cm/s, what pressure do they exert on the wall? [5]

d) A motorist wants to design a thermometer that can measure the temperature of his coolant. Draw a circuit that he may use. [4]

Question 3 **[20 marks]**

The cathode ray oscilloscope is a device for measuring changing voltage and frequencies.

a) What is the structure and function of the electron gun? [4]

b) What is the function of each of the following:

an evacuated tube phosphor screen

a positive anode negative high tension [4]

c) How would you explain CRO traces when an input probe is touched [2]

d) Explain how the principle of the CRO is used in electrocardiograms [4]

e) How could you explain parts and functions of a CRO to a class of 30 if you have only one CRO and various vacuum tubes? [6]

Question 4 **[20 marks]**

A Form 4 class experiment involves measuring the heating effect from an electric current. Apparatus available in the school lab per group:

constantan wire of 30swg of length 1,20m

DC power supply

connecting leads

Wooden supporrt with holes to allow accessories and cover calorimeter

-10 to 120^{0}C thermometer

calorimeter with lagging of cotton wool

stop watch

micrometer screw guage

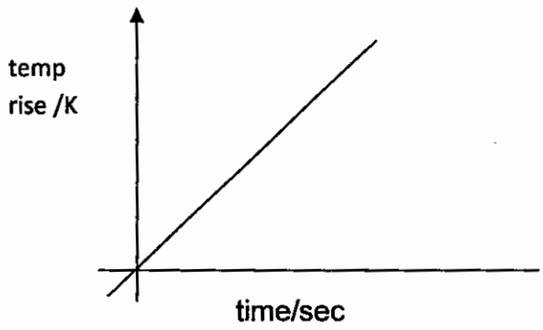
a) Draw a diagram of a physical setup you would instruct your class to follow [5]

b) Draw the circuit diagram of the setup [2]

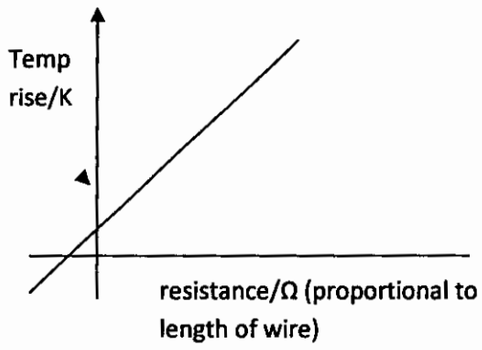
c) What errors should the teacher warn the class in carrying out the experiment [3]

d) Results of the experiment are as follows:

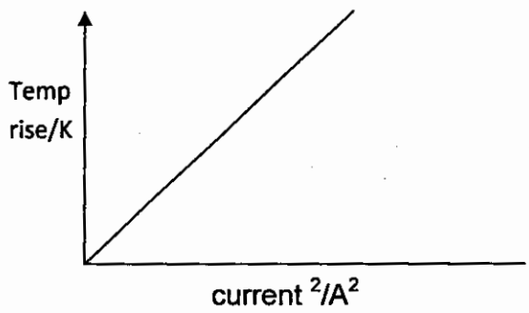
Constant current= A			
t /min	$\Theta_1/^0C$	$\Theta_2/^0C$	$\Delta\Theta/K$
2.0			
4.2			
5.8			
8.1			
10.0			



Constant current = A Constant time = s			
length of wire /cm	$\Theta_1/^0C$	$\Theta_2/^0C$	$\Delta\Theta/K$
10.0			
20.0			
30.0			
40.0			



Constant time = s					
I/A	I^2/A^2	$\Theta_1/^0C$	$\Theta_2/^0C$	$\Theta_1/^0C$	$\Delta\Theta/K$
1.0					
2.0					
3.0					
4.0					



i. What deductions can the class make about the heating effect of current? [4]

ii. Explain Joule's effect using equations of resistance, voltage and current. [6]

Question 5 [20 marks]

Large classes, little equipment and few teachers are some common characteristics of Swazi schools. If you are appointed to the Science department of one such school, how could you tackle the problem of experimentation in a large class? [20]