PHYSICS III 031 20/11/ 2019 8:30 AM – 10:00 AM	**REB** Rwanda Education Board

ADVANCED LEVEL NATIONAL EXAMINATIONS, 2019

SUBJECT: PHYSICS

PAPER III: PRACTICAL

COMBINATIONS:

- **PHYSICS –CHEMISTRY- MATHEMATICS (PCM)**

- **PHYSICS –CHEMISTRY- BIOLOGY (PCB)**

- **MATHEMATICS- PHYSICS-GEOGRAPHY (MPG)**

- **MATHEMATICS-PHYSICS- COMPUTER SCIENCE (MPC)**

DURATION: 1 Hour 30 minutes

INSTRUCTIONS:

1) Write your names and index number on the answer booklet as written on your registration form and **DO NOT** write your names and index number on additional answer sheets of paper if provided.

2) Do not open this question paper until you are told to do so.

3) This paper consists of **one** compulsory question. **(40 marks)**

4) You may use a non-programmable calculator and a mathematical set where appropriate.

5) All answers should be written in the answer booklet provided.

6) Use only a **blue** or **black** pen and a **pencil** for drawings.

Attempt all sub-questions of this question (40 marks)

In this experiment, you are required to determine the electromotive force and the internal resistance of an electrical battery (two dry cells connected in series).

Apparatus required: 1 rheostat

    1 ammeter

    1 voltmeter

    1 switch

    2 dry cells

    1 double cell holder or 2 single cell holders connected in series

    3 connecting wires 50 cm long each (of first color)

    3 connecting wires 50 cm long each (of second color)

Procedures:

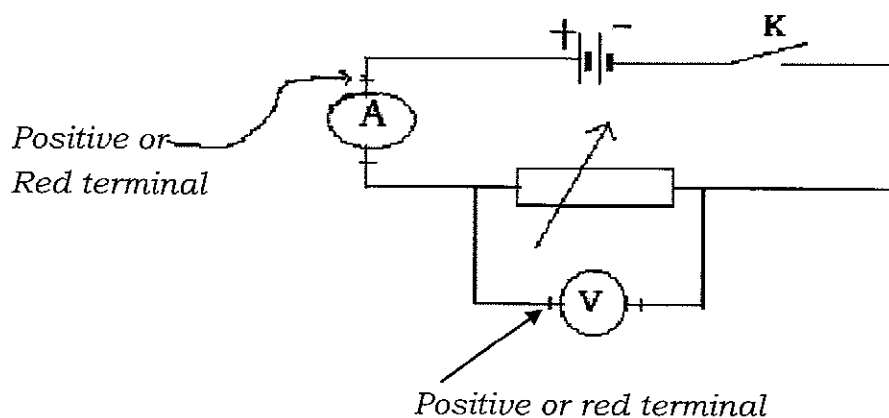a) Set up the apparatus as shown in the two figures below.

Figure 1
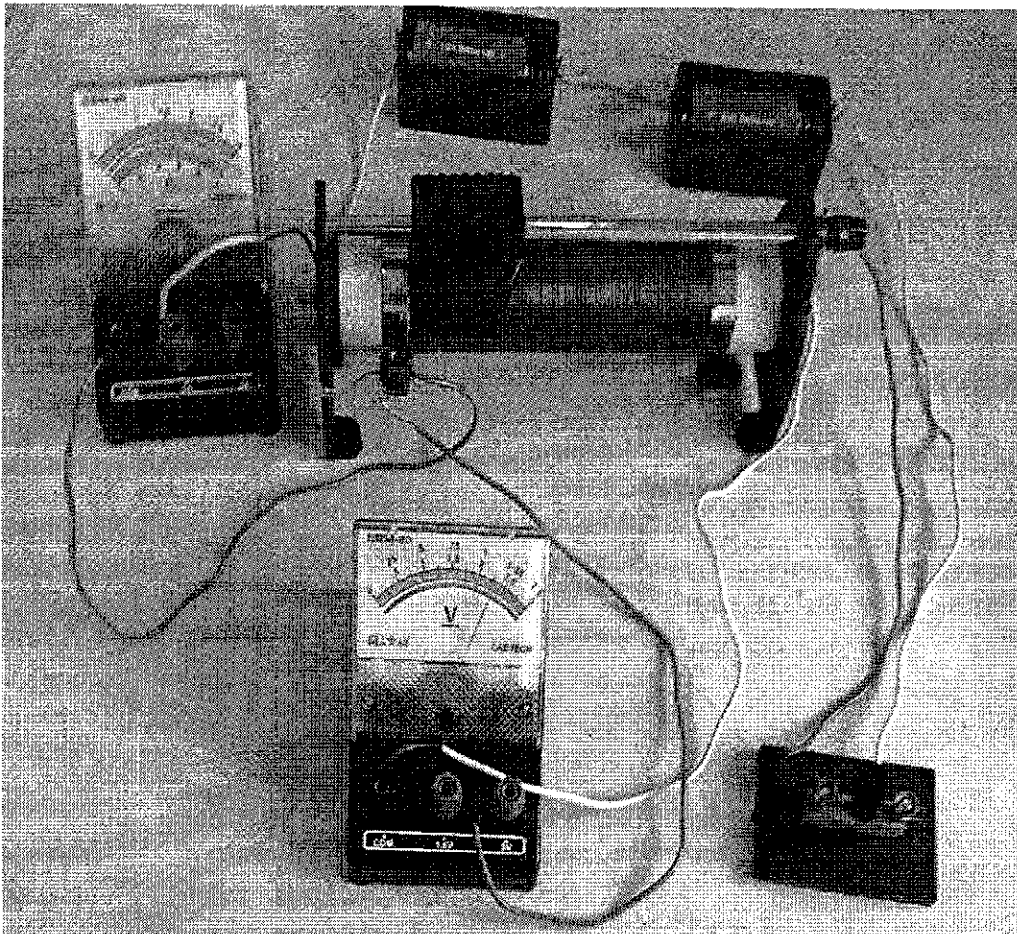
Figure 2

b) Use the range 0-1A for the ammeter and the range 0-3V for
   the voltmeter.

c) Close the switch K

d) Vary the length on the rheostat so that the reading on the ammeter, I=0.10 A

e) Record the reading U of the voltmeter to two decimal places.

   During the recording of the results, please open the switch K.

f) Repeat the procedures c) to e) for I =0.20; 0.30; 0.40; 0.50 and

   0.60 A respectively.

Questions :

   i) Write your results to two decimal places in a suitable table
       including I and U   **(16 marks)**

ii) Plot a graph of U (vertical axis) against I (horizontal axis). **(11 marks)**

iii) From the graph, determine the intercept E on the U axis which is the electromotive force (emf) of the battery. **(2 marks)**

iv) Determine the slope S of the graph. **(4 marks)**

v) From the slope, determine the internal resistance of the battery. **(2 marks)**

vi) Explain why the intercept of your graph is very close to the true value for the emf of the battery. Account for any difference. **(3 marks)**

vii) Mention any 2 precautions which should be taken during this experiment. **(2 marks)**