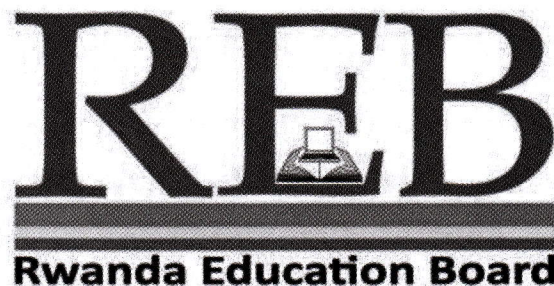


## Physics III

031

16/11/ 2016 8.30 am – 11.30 am



**ADVANCED LEVEL NATIONAL EXAMINATIONS, 2016**

**SUBJECT: PHYSICS**

**PAPER III: PRACTICAL PHYSICS**

**COMBINATIONS: - PHYSICS-CHEMISTRY-BIOLOGY (PCB)**

**- PHYSICS-CHEMISTRY-MATHS (PCM)**

**- MATHS-PHYSICS-GEOGRAPHY (MPG)**

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

**- PHYSICS-ECONOMICS-MATHS (PEM)**

**DURATION: 1Hour 30minutes**

### **INSTRUCTIONS TO CANDIDATES**

1. Do not open this question paper until you are told to do so.
2. 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.
3. This paper consists of **one** compulsory question. **(40 marks)**
4. You may use a non-programmable calculator, geometric set and a 30 cm ruler.
5. All answers should be written in the answer booklet provided.
6. Use only **blue** or **black** pen and **pencil**.

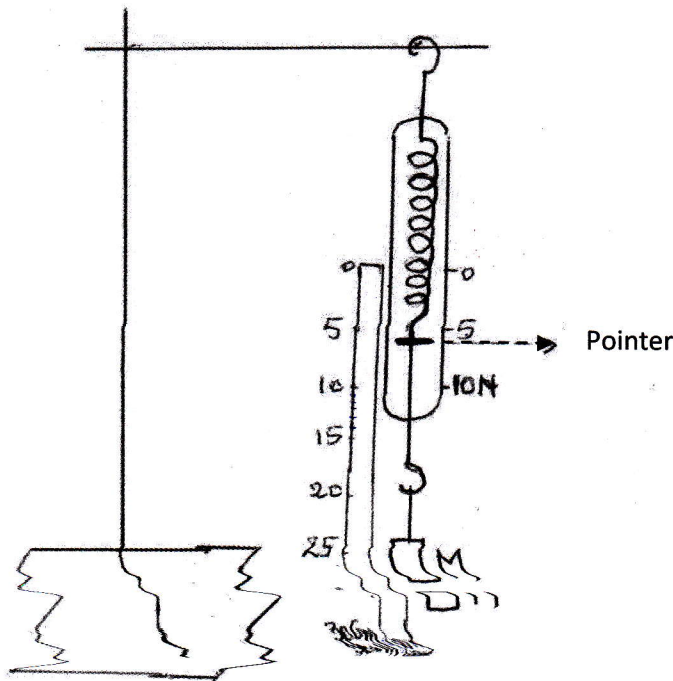
**ANSWER ALL QUESTIONS (40 MARKS)**

In this experiment, you will determine the force constant ( $k$ ) of the spring of a newton meter often called "spring balance" provided.

**Apparatus required:**

- 1 newton meter
- 1 complete retort stand set
- 1 mass hanger of 50 g and **9** masses of 50 g each or **1** mass hanger of 50 g and **1** mass of 50 g and **4** masses of 100 g each
- 1 piece of thread 30 cm long

a) Set up the apparatus as shown in the figure below by attaching the upper hook of the newton meter on the retort clamp.



b) Record the position  $P_0$  in newtons of the pointer of the newton meter to

1 decimal place when there is no mass hung from it i.e  $M = 0$  g.

**(1 mark)**

c) Suspend a mass hanger  $M = 50$  g from the free end (lower hook) of the newton meter.

- d) Read and record the new position  $P$  of the pointer in newtons to 1 decimal place.
- e) Use a ruler of 30 cm or 15 cm long with zero mark opposite to zero mark of the Newton meter to measure in cm to 1 decimal place the distance  $X$  that is between  $P_0$  and  $P$ .
- f) Repeat the procedures from (c) to (e) for mass values of  $M=100, 200, 300, 400$  and  $500$  g.
- g) Record your values in a suitable table including values of  $M, P,$   
 $P' = P - P_0$  and extension  $X$  of the spring. **(22 marks)**
- h) Plot a graph of  $P'$  (along a vertical axis) against  $X$  (along a horizontal axis). **(11 marks)**
- i) Find the slope  $S$  of the graph. **(2 marks)**
- j) From the slope; answer the question i.e. determine the force constant  $k$  in  $N/m$ . **(1 mark)**
- k) Discuss the result and whether or not it makes sense and with reason indicate if the result is or not accurate. **(3 marks)**



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