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KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATIONS, 2020/2021 ACADEMIC YEAR
FIRST YEAR, FIRST SEMESTER EXAMINATION
FOR THE DEGREE OF BACHELOR OF SCIENCE
(COMPUTER SCIENCE)

KPH - 101 PHYSICS I

Date: 14th December, 2020
Time: 8.30am – 10.30am

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

QUESTION ONE COMPULSORY (30 MARKS)

a) Define term simple harmonic motion.

(3 Marks)

b) The terms force, work, power, and energy often mean the same thing in everyday use. Obtain examples from advertisements, print media, radio, and television that illustrate meanings for these terms that differ from those used in physics.

(6 Marks)

c) State the relationship between displacement of a body from its mean position and the restoring force when a body executes simple harmonic motion.

(6 Marks)

d) Distinguish between the electromotive force (e.m.f.) of a cell and the potential difference (p.d.) across a resistor.

(3 Marks)

e) Three resistors are connected in series across a 75-V potential difference. R1 is 170Ω and R2 is 190Ω.

The potential difference across R3 is 21 V.

i) Find the current in the circuit.

(3 Marks)

ii) Find the resistance of R3.

(3 Marks)

iii) A cell has electromotive force (e.m.f.) E and internal resistance r. It is connected in series with a variable resistor R, as shown in Fig. 6.1.

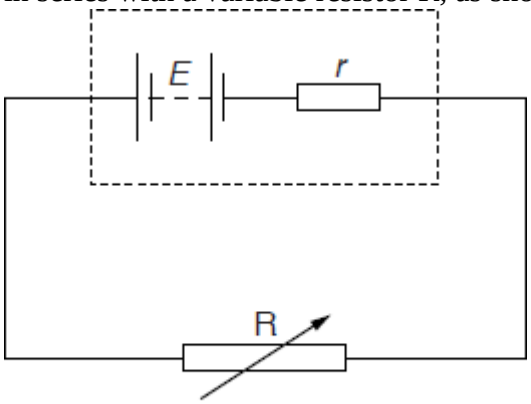

Fig. 6.1

iv) Define electromotive force (e.m.f.) (2 Marks)

v) The variable resistor R has resistance X. Show that;

$$\frac{\text{power dissipated in resistor R}}{\text{power produced in cell}} = \frac{X}{X + r}$$

Calculate variable resistor ® resistance (4 Marks)

QUESTION TWO (20 MARKS)

a) When the brakes are applied the car is brought to a stop. What has happened to the energy it had whilst moving? Explain**.**

(7 Marks)

b) The car starts going up a hill. The driver notices that the speed of the car begins to decrease. He has not applied the brakes or altered the setting on the accelerator. Explain in terms of energy why the car's speed begins to decrease**.** (7 Marks)

c) When the driver brakes, the distance needed to stop the car moving at 30 m/s up a hill is less than the distance on a flat road.

Explain why. (6 Marks)

QUESTION THREE (20 MARKS)

a) A body is supported by a spiral spring and causes a stretch of 1.5 cm in the spring .If the mass is now set in vertical oscillation of small amplitude. What is the periodic time of the oscillation? (6 Marks)

b) State the laws of gases usually associated with the names of Boyle, Charles and Dalton. (7 Marks)

c) Explain and discuss which branch of science includes the study of magnetism? In physics (7 Marks)

QUESTION FOUR (20 MARKS)

a) Distinguish between progressive and stationary wave motion.

(8 Marks)

b) Plane sound waves of frequency 100 Hz fall normally on a smooth wall. At what distance from the wall will the air particles have maximum amplitude of (Assume velocity of sound in air may be taken as 340 m s-1).

(12 Marks)

QUESTION FIVE (20 MARKS)

a) Explain why the rate at which the temperature rises slow down progressively as the heating process continues. (5 Marks)

b) You are asked to measure the specific heat capacity of aluminum using a cylindrical block of aluminum which has been drilled out to accept an electrical heater. Draw a complete diagram of the apparatus you would use.

(4 Marks)

A small house uses a tank containing 1.2 m 3 water as a thermal store. During the night its temperature rises to 98 oC. During the day, its temperature drops as the water is pumped round, the house radiators to keep the house warm. The density of water is 1 000 kg m^{-3} and its specific heat capacity is 4200 J kg^{-1} K^{-1}. Calculate the energy given out by the water on a day when its temperature drops from 98 °C to 65 °C.

Energy = …….. (6 Marks)

d) The six radiators in the house give out an average power of 1.5 kW each. For how long can they all operate at this power before the water temperature drops to 65 C?

Time = ... (5 Marks)