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**KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**UNIVERSITY EXAMINATION, 2022/2023 ACADEMIC YEAR**  
**FIRST YEAR, FIRST SEMESTER EXAMINATION**  
**FOR THE BACHELOR OF SCIENCE IN COMPUTER SCIENCE**  
**KPH 101 – PHYSICS I**

Date: 15<sup>TH</sup> DECEMBER 2022  
Time: 8:30AM – 10:30AM

**INSTRUCTIONS TO CANDIDATES**

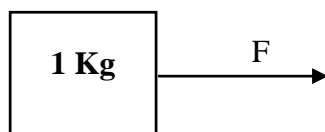
**ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS**

**QUESTION ONE (30 MARKS)**

- a) Define the following electrical component. (6 Marks)
- i) Resistor
  - ii) Fuse
  - iii) Integrated Circuit (IC)
- b) Describe the difference between Direct Current (DC) and Alternating Current (AC) (4 Marks)
- c) Differentiate between the following physical quantities (6 Marks)
- i) Force and work
  - ii) Power and Energy
  - iii) Stress and Strain
- d) Differentiate scalar quantity from vector quantity, giving an example of each quantity. (4 Marks)
- e) A car accelerates uniformly from rest. If it travels a distance  $D$  in time  $t$ , how far will it travel in time  $2t$ ? (4 Marks)
- f) If the car in e above has speed  $v$  at time  $t$  then what is the speed at time  $2t$ ? (2 Marks)
- g) Briefly describe the coefficient ( $\mu$ ) of static friction (4 Marks)

**QUESTION TWO (20 MARKS)**

- a) An electric heating coil will consume  $6.0 \times 10^2$  W of power when it is connected to a 120V outlet. A greenhouse operator has two such coils, and she wants to construct a single heater using the two coils to keep her small greenhouse at a temperature of  $50.0^\circ\text{C}$  during the winter months. For how many hours must this heater (two coils) operate per day if an average of  $1.5 \times 10^7$  J of energy are required each winter day to maintain the desired temperature given that the coils are connected.
- i) In series (4 Marks)
  - ii) In parallel (4 Marks)
  - iii) Which of the two arrangements is the most cost-efficient? Explain your answer. (2 Marks)
- b) Give four differences between static and kinetic friction. (4 Marks)
- c) An object rests on a horizontal floor. The coefficient static friction is 0.4 and acceleration of gravity is  $9.8 \text{ m/s}^2$ .

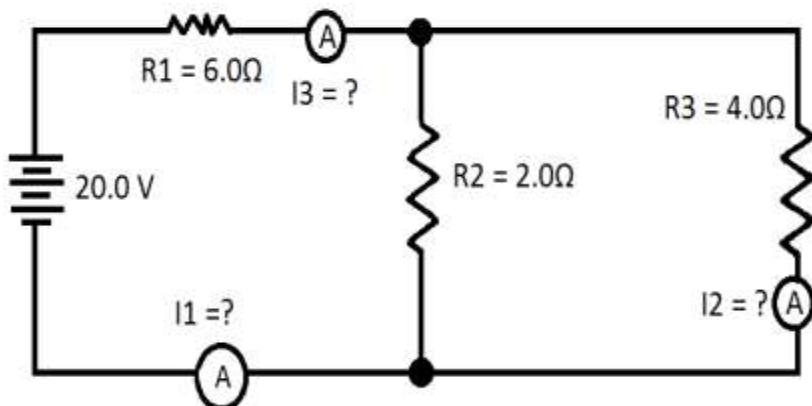


Determine,

- i) The maximum force of the static friction (3 Marks)
- ii) The minimum force of  $F$  (3 Marks)

### QUESTION THREE (20 MARKS)

- a) State Ohm's law. (2 Marks)
- b) A flashlight battery of emf 1.5V has an internal resistance of  $0.50\Omega$ . If there is a current of 1.0 A through the battery, what is the terminal voltage of the battery? (4 Marks)
- c) The figure below shows an electrical circuit with resistor R1 connected in series with two parallel resistors R2 and R3.



Given that the circuit is connected to a voltage source of 20V, calculate,

- i) Total Resistance (4 Marks)
- ii)  $I_1$ ,  $I_2$  and  $I_3$  Current values. (6 Marks)
- iii) Total power dissipated in the circuit. (4 Marks)
- d) Give the differences between kinetic and static friction? (4 Marks)

### QUESTION FOUR (20 MARKS)

- a) State Snell's law. (2 Marks)
- b) Describe the difference between the following (4 Marks)
- i) Focal length and focal point
- ii) Converging lens and diverging lens
- c) A swimmer is under water and looking up at the surface. Someone holds a coin in the air, directly above the swimmer's eyes at a distance of 50 cm above the water. Find the apparent height of the coin as seen by the swimmer (assume  $n = 1.33$  for water). (4 Marks)
- d) With the help of a diagram, describe total internal reflection between two media of different density e.g., glass and air. (4 Marks)
- e) A physics class has been assigned the task to determine an experimental value for the heat of fusion of ice. Student mass out 25.8 grams of ice and place it into a coffee cup with 100.0 g of water at  $35.4^\circ\text{C}$ . Then they place a lid on the coffee cup and insert a thermometer. After a few minutes, the ice has completely melted and the water temperature has lowered to  $18.1^\circ\text{C}$ . What will be their experimental value for the specific **heat of fusion of ice**? Use Calorimetry Formula. (6 Marks)

### QUESTION FIVE (20 MARKS)

- a) Differentiate between tensile stress and compressive stress (4 Marks)
- b) A steel wire 5m long and a radius of 2mm is attached to the roof ceiling. A weight of 100N is attached to the other end of the wire.
- i) Calculate the applied stress. (4 Marks)
- ii) If the above wire stretches 2.05 mm due to the 100N load, what will be the longitudinal (4 Marks)
- c) A 2000-kg car moving a curve of radius 200 m with the speed of 25 m/s. Calculate
- i) Angular velocity of the car (2 Marks)
- ii) The centripetal acceleration of the car. (2 Marks)
- iii) The force causing this kind of acceleration. (4 Marks)