

Entrance Examination
Physics and Chemistry

Duration: 2hours

Physics (14,75Mks)

I)

Figure1 is a diagram of a setup that can be used to verify a certain physics law. Use the diagram to answer the following questions

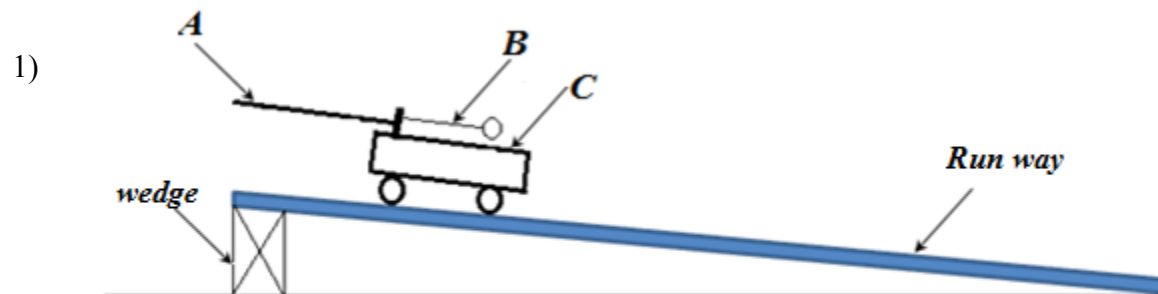


Figure 1

These experiment set up can be used to verify,

- A) The principle of conservation of linear momentum
- B) Principle of conservation of linear momentum
- C) Newton's first law of motion
- D) Newton's second law of motion 1mk

2) The component "A" is;

- A) A ticker tape timer
- B) A ticker tape 1 mk
- C) A cable to supply current to the device 'C'
- D) An elastic band

3) What is the function of the component 'B'?

- A) To prevent 'C' from moving down

- B) To hold components 'A' and 'C' together
- C) To enable a force to be applied on 'C' 1mk
- D) To enable 'A' to be aligned with the runway

4) Besides the equipment shown on the diagram, which other equipment will be useful in this experiment?

- A) Meter rule 1mk
- B) Stopwatch
- C) Newton meter
- D) Speedometer

Answer true or false for question 5 to 7

- 5) The component 'C' is called a trolley car or a car of initial (True) 0.5mk
- 6) The runway is raised to permit 'C' to move faster (false) 0.5mk
- 7) Friction can affect the result of the experiment (true) 0.5mk

II) Figure 2 is an experimental setup that can be used to determine the characteristics of a device

8) What is the name of the device whose characteristics can be determined from the set up ?

- A) Cell 1mk
- B) Voltmeter
- C) Ammeter
- D) Rheostat

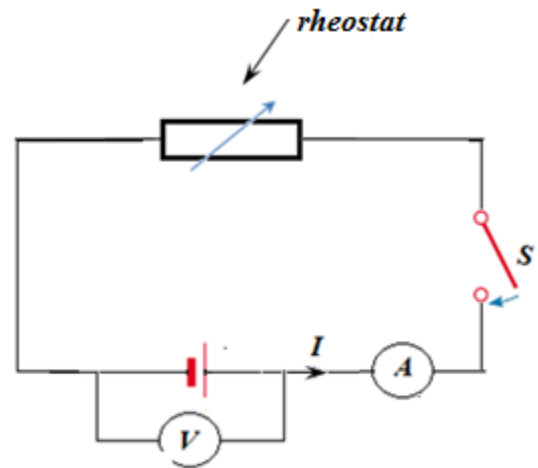


Figure 2

9) What is the function of the rheostat?

- A) To allow maximum current to flow in the circuit
- B) To allow minimum current to flow in the circuit

- C) To vary the resistance of the circuit hence making it possible to obtain different values for current and voltage 1mk
 C) To protect the ammeter and the voltmeter in the circuit

Answer true or false 10 to 14

- 10) The ammeter measures the current flowing in the cell (false) 0,5mk
 11) The circuit can be used to determine the emf and internal resistance of the cell (true) 0,5mk
 12) The ammeter can be protected by setting the rheostat to maximum before the switch is turned on. (true) 0,5mk
 13) Once the switch, S, is closed , the voltmeter will measure the emf of the cell (false) 0,5mk
 14) The circuit can be used to verify ohm's law (false) 0,5mk

III)

Consider the RLC circuit shown in figure 3, use the circuit to say whether the following statements below are true or false

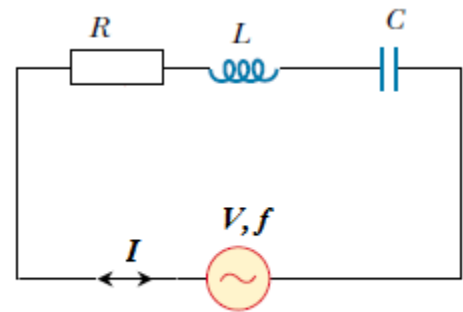


Figure 3

- 15) The current at all points in a circuit has the same amplitude and phase. (true) 1mk
 16) The impedance in the circuit is given by $Z = \sqrt{R^2 + (X_c - X_L)^2}$ (false) 1mk
 17) When $X_L > X_C$ current leads the applied voltage. (false) 1mk
 18) When $X_L = X_C$ the impedance is equals to the resistance and the current has its maximum value (true) 1mk
 19) The frequency at which maximum current occurs is called the *resonance frequency and its given by* $f_o = 2\pi \frac{1}{\sqrt{LC}}$ (false) 1mk

Chemistry (5 Mks)

1. An ionic compound $A^+ B^-$ is most likely to be formed when
 - A. The ionization energy of A is high and electron affinity of B is low
 - B. The ionization energy of A is low and electron affinity of B is high 0,5mk
 - C. Both the ionization energy and electron affinity of B are high are low
 - D. Both the ionization
2. The number of bonds in nitrogen molecules
 - A. one σ and one π
 - B. one σ and two π 0,5mk
 - C. three sigma only
 - D. two σ and one π
3. Which of the following statements is not correct regarding bonding molecular orbitals?
 - A. bonding molecular orbitals possess less energy than atomic orbitals from which they are formed
 - B. bonding molecular orbitals have low electron density between the two nuclei 0,5mk
 - C. every electron in the bonding molecular orbitals contributes to the attraction between atoms
 - D. bonding molecular orbitals are formed when the electron waves undergo constructive interference
4. Which of the following molecules has zero dipole moment?
 1. NH_3
 2. $CHCl_3$
 3. H_2O
 4. BF_3 0,5mk

5. Energy needed to remove an electron from its gaseous atom is called
- A. electron affinity
 - B. ionization energy 0,5mk
 - C. lattice energy
 - D. electronegativity
6. Born–Haber cycle is an application of
- A. first law of thermodynamics
 - B. second law of thermodynamics
 - C. first law of thermochemistry
 - D. Hess's law 0,5mk
7. An exothermic reaction is one in which
- A. enthalpy of reactants and products are same
 - B. heat is absorbed by system
 - C. enthalpy of products is greater than reactants 0,5mk
 - D. enthalpy of reactants is lesser than products
8. The solubility product of AgCl is $2.0 \times 10^{-10} \text{ mole}^2 \text{ dm}^{-6}$. The max concentration of Ag⁺ ions in the solution is
- A. $2.0 \times 10^{-10} \text{ mol dm}^{-3}$
 - B. $1.41 \times 10^{-5} \text{ mol dm}^{-3}$ 0,5mk
 - C. $1.0 \times 10^{-10} \text{ mol dm}^{-3}$

D. $4.0 \times 10^{-20} \text{ mol dm}^{-3}$

9. The solubility product expression for BaF_2 can be written as

A. $[\text{Ba}^{2+}][\text{F}^-]$

B. $[\text{Ba}^{2+}][2\text{F}^-]$

C. $[\text{Ba}^{2+}][\text{F}^-]^2$ 0,5mk

D. $[\text{Ba}^+][\text{F}^-]^2$

10. Which of following change will favour the formation of more SO_3 at equilibrium



A. by adding SO_3 at equilibrium

B. by increasing temperature

C. by decreasing temperature 0,5mk

D. by decreasing pressure