ST. MARY'S HIGH SCHOOL

CL-X, 3rd Unit Test-2021-2022

SUB-PHYSICS

Maximum Marks: 30

All questions are compulsory.

The intended marks for questions or parts of questions are given in brackets [ ].

SECTION A

(Attempt all questions)

[1X10=10]

Question 1

Choose the correct answers to the questions from the given options. (Do not copy the questions. Write the correct answer with proper option only.)

(i) Two notes are produced from a flute and piano, such that they have same loudness and same pitch. The notes so produced differ in their:

a. Waveform
b. Wavelength
c. Frequency
d. Speed

(ii) In natural vibrations, the vibrations are only under the

a. Damping force
b. Frictional force
c. Restoring force
d. External periodic force

(iii) In a parallel circuit:

a. P.D. across all resistors is ~~same~~ different.
b. Current flowing through all resistors is same.
c. The combined resistance of all resistors is less than individual resistors.
d. None of these.

(iv) If r is the internal resistance of a cell, such that E is its e.m.f., V is potential difference and R is the external resistance of circuit then the expression for internal resistance is:

a. $r = \frac{R(E-V)}{V}$
b. $r = \frac{(E-V)}{RV}$
c. $r = \frac{V}{R(E-V)}$
d. None of these

(v) Which is not the characteristic of a fuse wire?

a. It has high resistance
b. It has low melting point
c. It has low resistance
d. It is an alloy of lead and tin

(vi) An electric bulb whose filament is of resistance 4 Ω operates at 12 V for 20 s. The energy released by the bulb is:

a. 700 J
b. 720 J
c. 680 J
d. 740 J

(vii) The magnetic field of a solenoid cannot be increased by

(a) Increasing the number of turns in the solenoid
(b) Increasing the strength of current flowing through the solenoid
(c) moving the solenoid with greater velocity
(d) placing a laminated soft iron core within the solenoid.

(viii) Kilowatt hour is the commercial unit of :

a. Power
b. Electric energy
c. Heat energy
d. Mechanical energy

(ix) The base of a cooking pan is made thicker and heavy because:

a. It lowers the heat capacity of pan
b. It increases the heat capacity of pan
c. The food does not get charred and keeps hot for long time
d. Both (b) and (c)

(x) The thermal capacity of a solid is 400 J/K. The amount of heat supplied to it will be _____, if its temperature rises by 40 K.

a. 16000 J
b. 1600 J
c. 1000 J
d. None of these

SECTION B

(Attempt all questions)

Question 2:

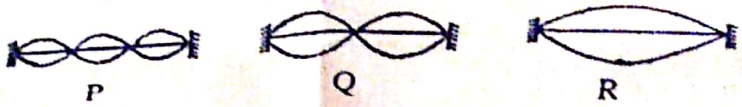
A. A person is tuning his radio set to a particular station.

(i) What is the person trying to do to tune it?

(ii) Name the phenomenon involved in tuning the radio set.

(iii) Define the phenomenon named by you in part (ii). **[3]**

B. The diagram below shows three different modes of vibration P,Q and R of the same string of a given length. Now answer the following questions:



(i) Which vibration will produce a louder sound and why?

(ii) Which vibration will produce a sound of maximum shrillness (or pitch) and why?

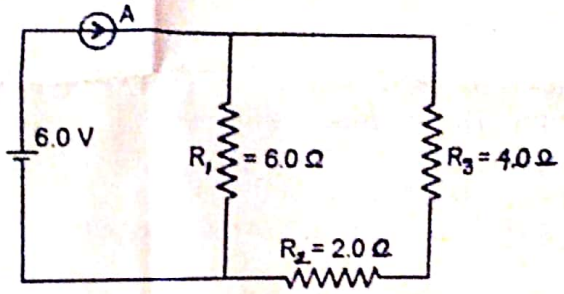
(iii) What is the ratio of the wavelength of vibrations of P and R? **[3]**

C. (i) The relationship between the potential difference and the current in a conductor is stated in the form of a law.

(a) State the law.

(b) What does the slope of V-I graph for a conductor represent?

(ii) Three resistors 6.0 Ω , 2.0 Ω and 4.0 Ω respectively are joined together as shown in the figure. The resistors are connected to an ammeter and to a cell of e.m.f. 6.0 V. Calculate:



(a) The effective resistance of the circuit.

(b) The current drawn from the cell. **[4]**

Question 3:

A. (i) Of the three connecting wires in a household circuit which two of the three are at the same potential?

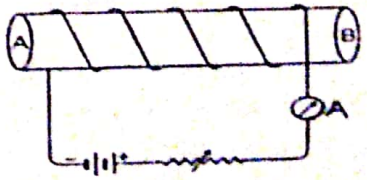
(ii) Name the device used to protect the electric circuit from overloading and short circuits.

(iii) On what effect of electricity does the above device work? **[3]**

B. (i) State a law which determines the direction of magnetic field around a current carrying wire.

(ii) State one factor on which the strength of an induced current depends.

(iii) Diagram alongside shows a circuit, containing a coil, wound on a long and thin hollow cardboard tube. Copy the diagram and state the polarity acquired by the face A of the coil.



[3]

C. (i) Define specific heat capacity of a substance.

(ii) You have a choice of three metals A, B and C, of specific heat capacities 900 $Jkg^{-1}{}^{0}C^{-1}$, 380 $Jkg^{-1}{}^{0}C^{-1}$ and 460 $Jkg^{-1}{}^{0}C^{-1}$ respectively, to make a calorimeter. Which material will you select? Justify your answer.

(iii) A metal piece of mass 50 g at 27°C requires 2400 J of heat energy in order to raise its temperature to 327°C. Calculate the specific heat capacity of the metal. **[4]**

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