PRELIM 1 2020 – 21

Std: 10 **Marks: 80**

Date: 10/03/21 **Subject: PHYSICS** **Dur.: 2 Hours**

SECTION 1

(ANSWER ALL QUESTIONS IN THIS SECTION)

Q1.a. State the conditions under which work done by a force is positive. 2

b. For a single movable pulley, select the appropriate option, 2

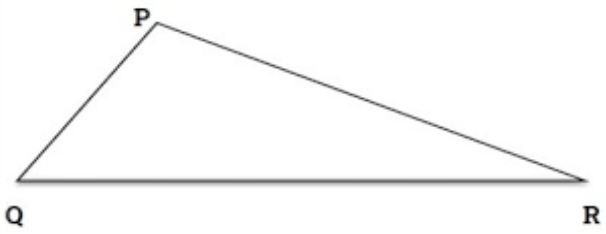
i) MA = 2, VR = 1, Speed multiplier.

ii) MA = 2, VR = 2, Force multiplier.

iii) MA = 1, VR = 1, convenient direction of effort.

iv) MA = 1, VR = 2, Force multiplier.

c. Copy the geometrical lamina drawn below to obtain the position of its center of gravity. Mark G in the diagram. 2



d. Calculate the amount of heat energy gained when 0.6kg of water at 28°C is brought to its boiling point. 2

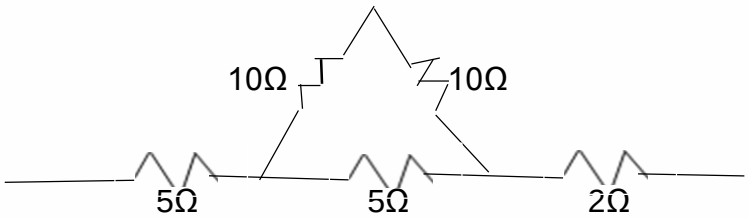
e. The refractive index of diamond is 2.42. What is meant by this statement? 2

Q2. a. Define Power. Express it in terms of two derived quantities. 2

b. A nucleus *Li*, having atomic number 3 and mass no. 7, emits a beta particle to form a nucleus *Be*. Write the symbolic equation of the process and what is the general name of the product nucleus formed with respect to the parent nucleus. 2

c. An object is placed at a distance X from a convex lens to obtain an inverted image, 15cm from the lens. If the focal length of the lens is 10cm, find X. 2

d. Find the equivalent resistance between P and Q from the figure below, 2



e. State the characteristics required for a material to be used as an effective fuse wire. 2

Q3. a. Define the CGS unit of work . 2

b. How is heat lost by convection and radiation prevented in a calorimeter? 2

c. List two common properties of electromagnetic waves. 2

d. Draw a labelled diagram of a three-pin socket. 2

e. Define the phenomenon that causes a loud sound when the stem of a vibrating tuning fork is kept pressed on a tabletop. 2

Q4. a. Derive an expression that relate the KE of a body with its momentum. 2

b. An electrical heater is rated 100KVA-220V. Calculate the electrical energy consumed in its commercial units, if the heater was operated for 2 hours. 2

c. Draw a diagram to show the use of a lens in the Galilean telescope. 2

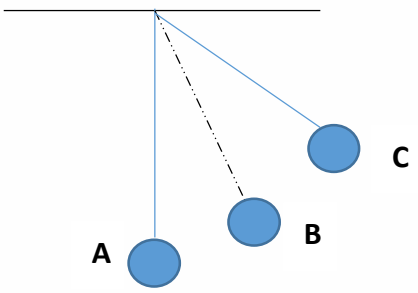
d. What are Becquerel rays? Name the phenomenon due to which these rays are emitted. 2

e. When is a body said to be at a, "*state of equilibrium*"? 2

SECTION 2

(ATTEMPT ANY 4 QUESTIONS FROM THIS SECTION)

Q5. a. A freely oscillating pendulum is shown below. 3



Identify the positions at which, the bob

i) possess maximum PE.

ii) PE = KE

iii) the mechanical energy is conserved.

b. A load of 220kg is vertically pulled up by a crane through a height of 16m in 40s. Calculate i) Force acting against gravity. ii) Total work done. iii) Horse power of the engine pulling the rope. ($g=10m/s^2$,1HP = 750W). 3

c. What is the energy transformation in the process of photosynthesis? Also identify the energy possessed in the following, i) a shooting arrow. ii) water stored in an overhead tank, iii) A guitar string plucked. 4

Q6.a. A uniform metre scale of weight 50gf is balanced at the 40cm mark, when a weight of 100gf is suspended at the 5cm mark. Where must a weight of 80gf be suspended to balance the metre scale? 3

b. i) Name the radiations that are electromagnetic.

ii) What happens to the atomic number when these radiations are emitted?

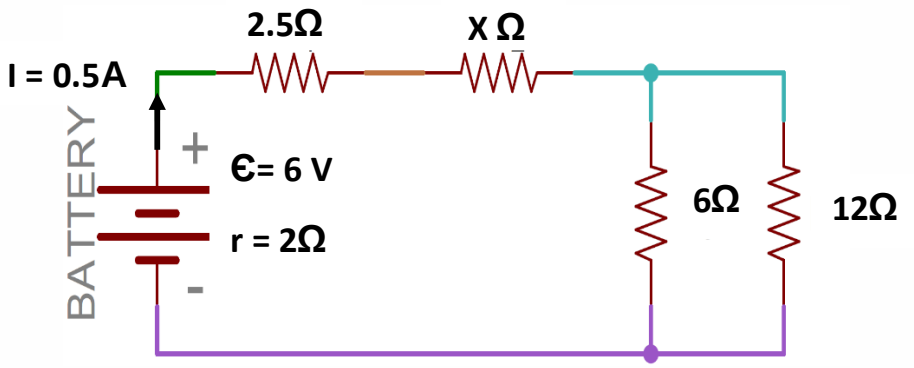
iii)What is the influence on these radiations when exposed to a magnetic or electric field? 3

c. i) What are nuclear waste? Suggest a suitable way for its safe disposal. 2

ii) A stone is whirled around in a circular path by tying it to a strong string with help of your hand. Is the stone moving with uniform acceleration? What kind of force acts on the stone and state its direction. 2

Q7. a. State three factors that determine the quantity of heat produced in a conductor. 3

b. Observe the circuit diagram shown below and obtain the value of the resistor, **X**. 3



c. i) Define the quantity measured by the unit, **Ωm.**

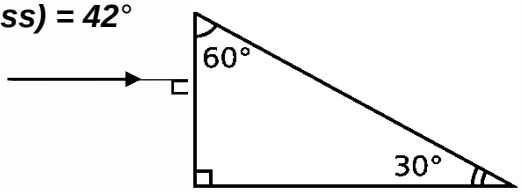
ii)With increase in temperature of metals, what is the effect on the above-mentioned quantity of metals?

iii) What are non ohmic resistors? Give an example. 4

Q8. a. The wavelength of an electromagnetic wave is 80Å. i) Identify this wave.

ii) What is the speed of the wave in air. iii) State one use of the above wave. 3

b. Complete the following ray diagram, if, i_c ***(glass) = 42°*** 3



c. i) Sam is surprised to see the pencil he placed in a beaker of water looks different. Name the phenomenon responsible for the change and illustrate this change with a ray diagram. 2

ii) Draw an ***i – δ*** *curve* to show the variation of the angle of deviation with the angle of incidence. On the curve, mark the point of minimum deviation. 2

Q9. a. You are required to make a water bath (mix of hot and cold water) of mass 50kg at 45°C, by mixing hot water at 90°C with cold water at 20°C. Calculate the mass of hot water needed. 3

b. i) What do you understand by the term, '*thermal capacity*'. State its SI unit.

ii) With a forecast of frost, a wise farmer waters his fields. Give suitable reasons. 3

c. Why is a machine not 100% efficient?

A pulley system with velocity ratio 4 is used to lift a load of 100kgf through a height of 15m by applying a force of 40kgf. Calculate, i) distance through which effort is applied. ii) work done by the effort. iii) efficiency of pulley system. 4

Q10.a. Name the waves used in the process of *sound ranging.* Justify with one suitable reason. Are these waves audible to us? 3

b. A man standing away from a cliff produces a sound and receives the reflected sound after 0.09s. Calculate i) distance of man from the cliff if speed of sound is 340m/s. Will the man hear a distinct echo? 3

c. i) Define *timbre.* State the factor it depends on. 2

ii) What are damped vibrations? Name 2 forces that act on a body undergoing damped vibrations. 2