HALF YEARLY EXAMINATION: 2020 – 2021
SCIENCE - Paper -1 (**Physics**)
(Two Hours)

Answers to this paper must be written on the paper separately.
*You will **not** be allowed to write during the first **15** minutes.*
This time is to be spent in reading the question paper.
The time given at the head of this paper is the time allowed for writing the answers.
*Attempt **all** questions from **Section A** and attempt **any four** from **Section B**.*
The intended marks for questions or parts of questions are given in brackets [ ].
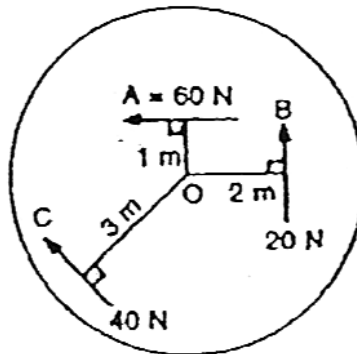

SECTION I [Marks 40]

Attempt <u>all</u> questions from this Section.

Question 1

(a) State and define the S.I. unit of resistance. [2]
(b) A ray of red light and a ray of violet light travel from air to glass at the same angle of incidence. Which of them suffers greater deviation? Why? [2]
(c) A stone is whirled by a boy in circular path with constant speed
     i) Is the stone moving with uniform/ variable velocity?
     ii) Name the force acting on the stone. [2]
(d) A pendulum is swinging about its mean position. In which position it has
          i) maximum potential energy   ii) maximum kinetic energy? [2]
(e) A metal ball of mass 60 g falls on a concrete floor from a vertical height of 2.8 m and rebounds to a height of 1.3 m. Find the change in K.E. in S.I. units.(g =10ms^{-2}) [2]

Question 2

(a) What are the two essential conditions for total internal reflection? [2]
(b) Differentiate between refractive index and absolute refractive index of a medium. [2]
(c) Peter's mother set up a dinner table for Peter. She toasted bread and used a blender to make frothy chocolate milk shake, just as Peter liked. She then set a fire roaring in the fireplace. State two energy changes in the given example, clearly stating the action along with the energy changes. [2]
(d) In the following diagram:
     calculate the resultant moment of
      force about O. [2]

(e) Stars appear to twinkle on a clear night. Give the phenomenon and explain. [2]

[TPS-Std.10–**Physics**- Half Yearly Examination–12/10/2020]
This paper consists of 4 printed pages

Question 3

(a) State two factors on which specific resistance of a substance depends? [2]

(b) Draw a diagram to show the force/forces which bring about the turning of a water tap and state the phenomenon. [2]

(c) State one circumstance when one may get an electric shock from an electric gadget. What preventive measure must be provided with the gadget to avoid it? [2]

(d) i) Name the unit of physical quantity obtained by the formula $2K/V^2$.
Where K:kinetic energy, V :linear velocity.
ii) Is torque a scalar quantity? [2]

(e) i) Name the substance whose resistance decreases with the increase in temperature.
ii) Name the substance whose resistance increases with the increase in temperature. [2]

Question 4

(a) There are three pins in an electric plug top.
i) How would you identify the earth pin
ii) To which wire should a switch be connected? [2]

(b) Why is a ladder more likely to slip when the man is high up on it than when he just begins to climb? [2]

(c) State the position of centre of gravity of a rectangular lamina ABCD and draw its rest position when it is suspended freely from point A. [2]

(d) What is the relationship between the mechanical advantage and the velocity ratio for:
i) an ideal machine   ii) a practical machine? [2]

(e) Calculate the value of the resistance which must be connected to a 15Ω to provide an effective resistance of 6Ω. [2]

SECTION – II [Marks 40]

(Attempt any **four** questions from this Section)

Question 5

(a) i) It is easier to turn the steering wheel of a large diameter than that of a small diameter. Give reason.
ii) Where is the centre of gravity of a uniform ring situated? [3]

(b) Draw a diagram of a pulley system of velocity ratio 4. Calculate its mechanical advantage if its efficiency is 90%. [3]

(c) A truck driver loads some oil drums into a truck by lifting them directly. Each drum has a mass of 80 kg and the platform of the truck is at a height of 0.8 m above the ground.
(i) What force is needed to lift a drum into the truck?
(ii) How much energy is used up in lifting a drum?
(iii) After the truck is loaded, the driver drives off. List the major energy changes that take place in moving the truck.
(iv) The driver stops the truck at the factory gate. What happens to the kinetic energy of the truck? [4]
Take g = 10 m/s^2

Question 6

(a) The focal length of a convex lens is 30 cm. At what distance from the optical centre of the lens must an object be placed to obtain a virtual image of twice the size? [3]

(b) Draw a neat labelled ray diagram to show the formation of a virtual, diminished image, using a spherical lens. [3]

(c) The circuit diagram shown below three resistors 2Ω, 4Ω, $R\Omega$, connected to a battery of e.m.f. 2 V and internal resistance 3Ω. If the main current is 0.25 A flows through the circuit, find:
(i) the effective resistance of the circuit,
(ii) the value of R. [4]
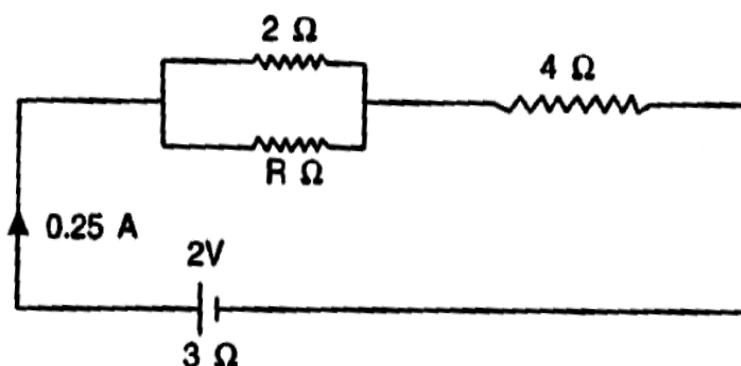
Question 7

(a) Justify giving proper reason, whether the work done in the following cases is negative, positive or zero:
i) A man lifts a bucket out of a well, by means of a rope tied to the bucket.
ii) The work done by gravity in the above case.
iii) Work done by the brakes of a car when applied. [3]

(b) i) Sketch a graph to show the change in potential difference across the ends of an ohmic resistor and the current flowing in it.
ii) What does the slope of the graph represent? [3]

(c) i) Name the material of fuse. State one characteristic of the material used for fuse.
ii) A postage stamp appears raised by 10 mm when placed under a thick glass block of refractive index 1.45. What is the thickness of glass block? [4]

Question 8

(a) i) Name the electromagnetic spectrum used in night photography.
   ii) State its wavelength range .
   iii) Mention one way to detect these waves.   [3]

(b) i) State the work-energy theorem.
   ii) Calculate the work done by the engine of a Range Rover of mass 100 kg when it changes
       its constant speed from 10 ms^{-1} to 20 ms^{-1} in 5s.   [3]

(c) i) Name the device used to protect the electric circuits from overloading and short circuits.
   ii) On what effect of electricity does the above device work?
   iii) Where is the above device connected in the circuit and why?   [4]

Question 9

(a) Iron door of a building is 5 m broad. It can be opened by applying a force of 100 N normally at
    the middle of the door. Calculate :
    i) Torque needed to open the door.
    ii) Least force and its point of application to open the door.   [3]

(b) In the given figure ,
    i) What will be velocity ratio?
    ii) Calculate the amount of effort E
        if the efficiency is 80%.
    iii) What changes can be made
        in the pulleys to increase its efficiency?   [3]

25N
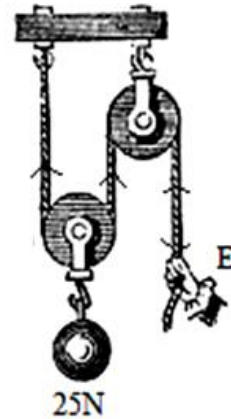
(c) Copy the diagrams and complete the path of the ray AB through the prism of critical angle 42^0.
    (i)   (ii)   [4]