GREEN LAWNS HIGH SCHOOL

PRELIMANARY EXAMINATION 2020-21

SUBJECT: PHYSICS   **CLASS: X**
TIME: 2 HOURS   **MARKS: 80**

Note:
- You will not be allowed to write during the first 10 minutes. Use this time to read the paper carefully.
- The time given at the head of this paper is the time allowed for writing the answers.
- The intended marks for a question are given in the brackets.
  Write concise, to the point answers using scientific terms.
- Section I : Compulsory
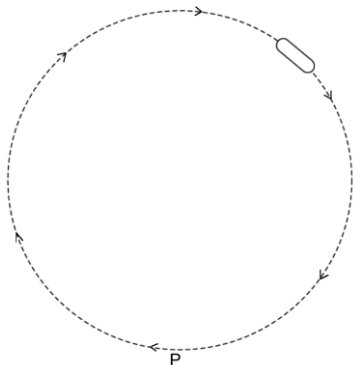- Section II : Attempt any 4 questions.

Section I – 40 marks (Attempt **all** questions)

Question: 1   **(10)**

1) i) Define: Centre of gravity.   (2)
   ii) What is the position of the centre of gravity of a solid rod?

2) An object undergoes uniform circular motion as shown in the diagram   (2)
below.

i) Show the direction of the object's velocity 'v' and force 'F' respectively using arrows.
ii) Show the path of the object after the force F stops acting at P.

3) A bullet of mass 5 g moves with a speed of 400 ms^{-1}.   (2)
i) Calculate its kinetic energy.
ii) How fast should a boy of mass 50 kg move in order to possess equal kinetic energy?

1

4) State the energy changes in the following cases while in use: (2)
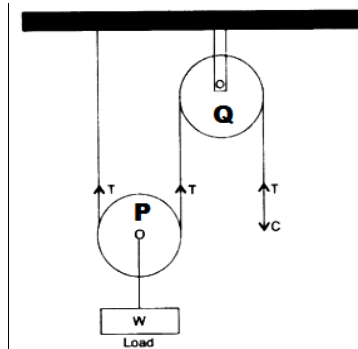i) Photocell.
ii) Dynamo.

5) i) How radioisotopes are used by engineers in industries? (2)
   ii) Write on use of tracers used in medical industry.

Question: 2 **(10)**
1) i) In the following pulley system, what is the function of pulley Q? (2)


ii) If the displacement of load is less than the displacement of effort, the velocity ratio of this machine will be more than 1, less than 1 or equal to 1 and what do we call such machine?

2) A bird is flying 3m above the surface of water and fish is swimming 4m (2)

below the surface of the water. ($_a\mu_w$= 4/3)
i) At what depth does the fish appear to the bird?
ii) At what height does the bird appear to the fish?

3) A ray of light PQ is incident normally on the hypotenuse of prism whose (2) angles are 30°, 60° and 90°. Complete the path of the ray PQ till it emerges from the prism. Mark in the diagram the angles wherever necessary.
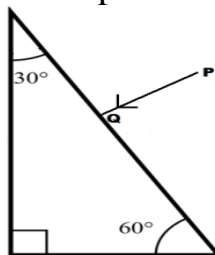
4) i) Define: Focal length of the lens. (2)
ii) Explain what happens to the focal length of a lens if its peripheral part is covered.

5) A converging lens forms the image of an object placed in front of it, (2) beyond $2F_2$ of the lens. Draw a ray diagram to show the formation of the image.

Question: 3 **(10)**

1) Which colour of light is deviated most by a prism? Justify your answer. (2)

2) The speed of ultrasonic sound waves is same as audible sound waves in (2) particular medium still ultrasonic waves are used widely than audible sound waves. Why? Give two reasons.

3) Differentiate between the following based on the points given in brackets: (2) Natural Vibrations and Damped Vibrations (Amplitude and Frequency)

4) How internal resistance of a cell will change if- (2)
   i) Distance between the electrodes is increased from 2.5 cm to 3.5cm.
   ii) The temperature of the electrolyte is increased from 25^OC to 30^OC.

5) When current is passed in a wire, heat is produced. (2)
   i) Name the law which explains this fact.
   ii) Also write the expression/relation of this law.

Question:4 **(10)**

1) A fuse is rated 15A. Can it be used with an electrical appliance of rating (2) 2 kW, 200 V? Support your answer with calculation.

2) At what voltage is the electric power generated at the power generating (2) station? Why its voltage raised before it is transmitted?

3) i) The specific latent heat of fusion for ice is 336000 J kg^{-1}. What is the (2) meaning of this statement?
   ii) What is the S.I. unit of Thermal capacity?

4) There are two metal blocks A and B of masses 4kg and 3kg respectively. (2) When same amount of heat is provided to both these block their temperature increased by 2^OC each. Compare their specific heat capacities.

5) i)Why is the penetrating power of alpha particle is very small ? (2)
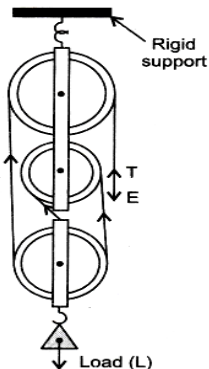   ii) How alpha particles are useful in transmutation?

Question: 5 (10)

1) The diagram below shows a pulley system used to lift a load of 400 N (3) against the gravity.

i) What is the velocity ratio of this pulley system?

ii) What will be the mechanical advantage of this pulley system if its efficiency is 80%?

iii) Why is the efficiency of pulley not 100%?

2) On a see-saw, two children of masses 40 kg and 45 kg are sitting on one (3) side of it at distances of 1.5 m and 2 m respectively from the fulcrum. How far on the other side of the fulcrum should a man of mass 75 kg sit in order to balance the see-saw?

3) The diagram below shows a force-displacement graph for a freely falling (4) body of mass 200 g. If the shaded area is 40 sq.unit, then answer the following questions- ($g = 10ms^{-2}$)
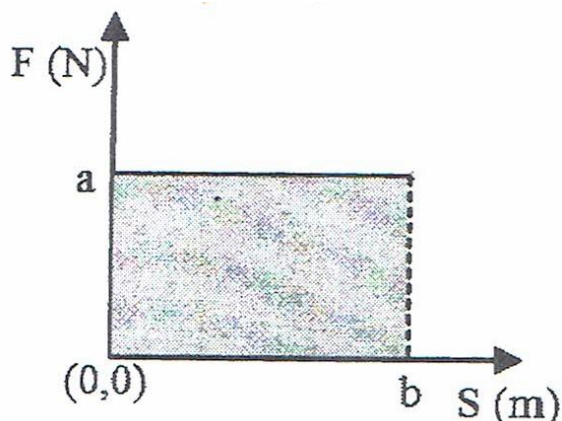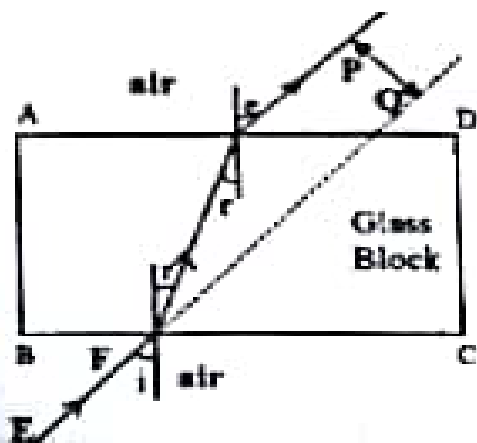

i) Calculate the value of 'a'.

ii) Calculate the value of 'b'.

iii)What is the work done corresponding to the displacement 'b' m?

Question: 6 (10)

1) The diagram below shows a monochromatic light ray EF passing (3)
through a rectangular glass slab ABCD and emerging out of it.

i) Name the distance PQ.

ii) Explain with reason, whether distance PQ increases, decreases or remains the same when outside medium is replaced from air to water.

2) Wavelength of light changes from 540 nm to a certain value when it (3)
enters from air to acetone of refractive index 1.35.

i) Calculate the changed wavelength.

ii) Also state how does it affect frequency of light?

3) Study the diagram given below and answer the following questions: (4)
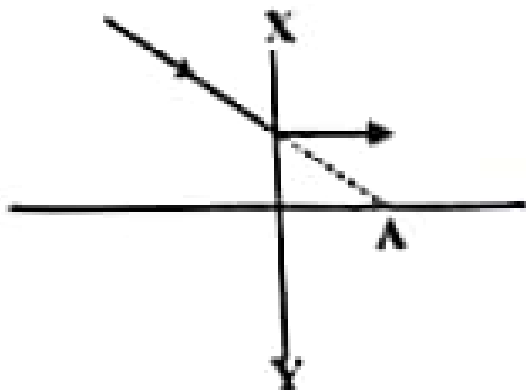
i) Name the lens XY.

ii) Define point A.

iii) An object is placed in front of this lens at a distance of 15 cm from the optical centre and its image is formed at a distance of 6 cm from the optical centre. Calculate the focal length of this lens.

Question: 7 (10)

1) The following diagram shows a wire stretched over a sonometer. Stems (3) of two vibrating forks A and B are touched to the wooden box of the sonometer. It is observed that the paper rider present on the wire flies off when vibrating tuning fork B is touched to the wooden box but paper just vibrates when stem of vibrating tuning fork A is touched to wooden box.
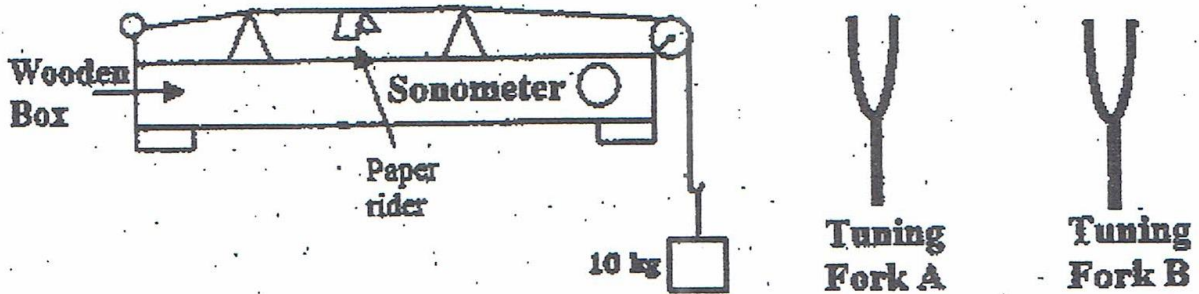
i) Define the phenomenon because of which paper rider just vibrates.

ii) Explain the phenomenon because of which the paper rider flies off when tuning fork B is touched to the wooden box?

iii) Write one example of phenomenon mentioned by you in part ii)

2) There is a sunken ship at a depth of 50 m in a sea. From the surface of sea (3) a deep sea diver sends waves to locate it.

i) Find the time when the wave, after reflection will reach the diver. Speed of sound in water = 1400 ms^{-1}.

ii) State whether an echo is heard or not. Justify your answer.

3) Explain any 4 factors affecting the loudness of sound. (4)

Question: 8 (10)

1) Observe the following circuit diagram and calculate: (3)

i) The resistance of the circuit.

ii) The current in 4 Ω resistor.
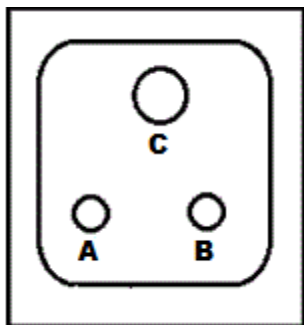
iii) The terminal voltage of a cell.
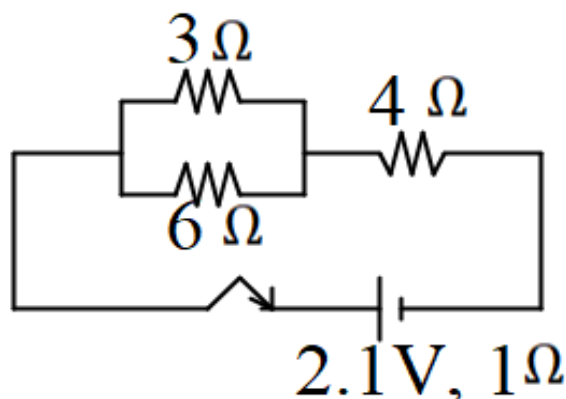
2) i) Draw a graph of potential difference (V) versus current (I) for an ohmic resistor . (3)

ii) How to find the resistance of the resistor from this graph?

iii) Give two examples of non-ohmic resistor.

3) i) The following figure shows three-pin socket, state which wire will be connected in holes labelled as A,B and C. (4)

ii) Why is hole C is bigger than other two holes?

iii) To which wire joined to hole A or B, is the fuse connected?

iv)Why MCB is preferred over fuse? Give two reasons.

Question: 9 (10)

1) Give scientific reasons for the following: (3)

 i) Riya experinced a hailstorm. She noticed that it was colder after the hailstorm than during or before.

ii) Sandeep always adds salt while cooking dal.

iii) Steel utensils often come with a copper bottom.

2) A piece of ice at 0°C is heated at a constant rate and its temperature recorded at regular intervals till steam is formed at 100°C. Draw a temperature – time graph to represent the change in phase. Label the different parts of your graph. (3)

3) A calorimeter of mass 60 g and specific heat capacity 0.4 J g^{-1} °C^{-1} contains some mass of water at 30°C. A metal piece of mass 20 g at 100 °C is dropped into the calorimeter. After stirring, the final temperature of the mixture is found to be 32°C. Find the mass of water used in the calorimeter. (4)

[specific heat capacity of the metal piece = 0.2 Jg^{-1} °C^{-1} ; specific heat capacity of water = 4.2 Jg^{-1} °C^{-1}]
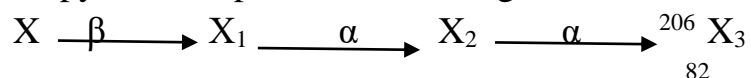
Question: 10 **(10)**

1) A nucleus $^{24}_{11}Na$ emits beta particle to change into msgnesium (Mg) (3)

i) Write a balanced nuclear reaction for the above process.

ii) What are numbers 11 and 24 are called?

iii) What general name is given to product element with respect to $^{24}_{11}Na$?

2) Copy and complete the following nuclear reaction: (3)

$$X \xrightarrow{\ \beta\ } X_1 \xrightarrow{\ \alpha\ } X_2 \xrightarrow{\ \alpha\ } {}^{206}_{82}X_3$$

3) (4)

i) A radioactive substance is freezed. What change would you expect to take place in the nature of its radioactivity ? Give a reason for you answer.

ii) A radioactive source emits three type of radiations-

  a) Name the radiation of which travels with speed of light.

  b) Name the radiation which causes least biological damage.

  c) Name the radiation which is deflected the most.