TOPPER LEARNING

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MOST IMPORTANT QUESTIONS

ICSE
Class X Physics
Most Important Questions

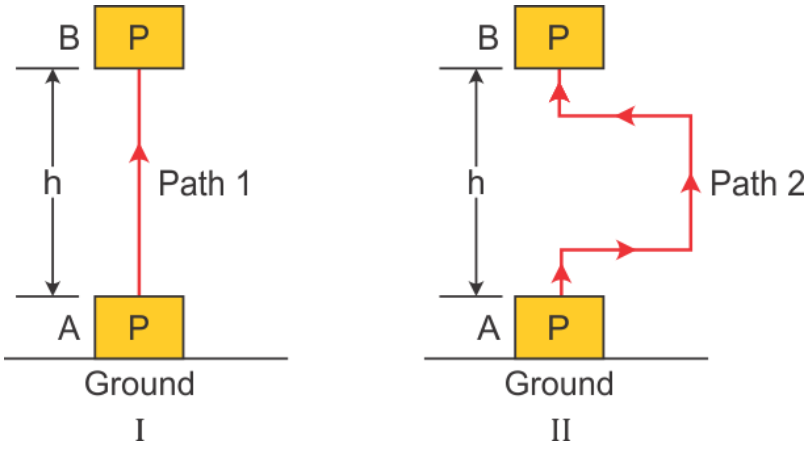
Chapter 1: Force

1. A force is applied on [2 M]
   (i) a rigid body and
   (ii) non rigid body.
   How does the effect of force differ in the two cases?
2. Explain the motion of a planet around the Sun in a circular path. [2 M]
   State and explain the principle of moments. Draw a diagram to illustrate. [3 M]
3. What are [3 M]
   (i) Centripetal forces
   (ii) Centrifugal forces?
4. State and explain the principle of moments. Draw a diagram to illustrate. [4 M]
5. A ball is placed near the periphery of a merry-go-round and is tied to its centre. Merry-go-round is rotating about an axis passing through its centre. [4 M]
   (i) What will be your observation when you are standing outside the merry-go-round? Explain it.
   (ii) What will be your observation when you are standing at the centre of the merry-go-round? Explain it.

Chapter 2: Work, Energy and Power

1. A force is applied on a body of mass 20 kg moving with a velocity of 40 ms^{-1}. The body attains a velocity of 50 ms^{-1} in 2 seconds. Calculate the work done by the body. [2 M]
2. How is work done by a force measured when the force: [2 M]
   (i) is in the direction of displacement?
   (ii) is in an angle to the direction of displacement?
3. An engine can pump 30,000 litres of water to a vertical height of 45 metre in 10 minutes. Calculate the work done by the machine and the power.
   (Density of water = 10^3 kg/m^3, 1000 litre = 1 m^3, g = 9.8 m s^{-2}) [3 M]

4. An object 'P' of mass m is lifted from a point A on ground to point B at a height 'h' above the Earth by Rina and Mita, but the path taken for doing it is different by both as shown [3 M]



(i) Calculate the work done in both the situations.

(ii) In the above given cases, which force is doing positive work and which one is doing negative work?

5. A force of 100 N acts on an object of mass 10 kg for 9 sec. If the object was initially moving with the speed of 10 m/s, calculate the initial and final kinetic energy of the object. By what factor does the kinetic energy increase? [4 M]

6. [4 M]

(i) State the energy in the following while in use:

(a) Burning of a candle.

(b) A steam engine.

(ii) On what basis would you classify an energy source as renewable? State two advantages and two limitations of the energy received from the Sun.

Chapter 3: Machines

1. A type of single pulley is very often used as a machine even though it does not give any mechanical advantage. [2 M]

(i) Name the type of pulley used.

(ii) For what purpose is such a pulley used?

2. Draw a simplified diagram of a lemon crusher, indicting of load and effort. [2M]

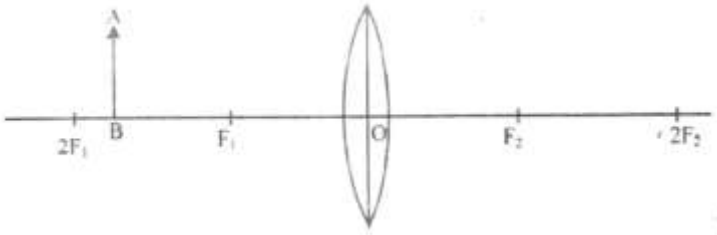
3. A coolie is pushing a box weighing 1500 N up an inclined plane 7.5 m long on to a platform 2.5 m above the ground. [3 M]
   (i) Calculate the mechanical advantage of the inclined plane.
   (ii) Calculate the effort applied by the coolie.
   (iii) In actual practice, the coolie needs to apply more effort than what is calculated. Give one reason why you think the coolie needs to apply more effort.
4. Derive a relationship between the mechanical advantage, the velocity ratio and the efficiency of a machine. [3 M]
5. A block and tackle pulley system has a velocity ratio of 3. [4 M]
   (i) Draw a labelled diagram of this system. In your diagram, indicate clearly the points of application and the directions of the load and the effort.
   (ii) Why should the lower block of this pulley system be of negligible weight?

Chapter 4: Refraction of Light at Plane Surfaces

1. [2 M]
   (i) The refractive index of glass with respect to air is 1.5. What is the value of refractive index of air with respect to glass?
   (ii) A ray of light is incident as a normal ray on the surface of separation of two different mediums. What is the value of the angle of incidence in this case?
2. What are the necessary conditions for the total internal reflection? [2 M]
3. [3 M]
   (i) Can the absolute refractive index of a medium be less than one?
   (ii) A coin placed at the bottom of a beaker appears to be raised by 4.0 cm. If the refractive index of water is 4/3, find the depth of the water in the beaker.
4. Neha puts a scale into a glass container having water and is surprised to see the scale in a different state. [4 M]
   (i) What change is observed in the appearance of the pencil?
   (ii) Name the phenomenon responsible for the change.
   (iii) Draw a ray diagram showing how the eye sees the pencil.

Chapter 5: Refraction through a Lens

1. Riya claims to have obtained an image twice the size of the object with a concave lens. Is she correct? Give a reason for your answer. [2 M]
2. [2 M]
   (i) Define the power of a lens.
   (ii) What will be the power of a convex lens of focal length 25cm?
3. A linear object is placed on the axis of a lens. An image is formed by refraction in the lens. For all positions of the object on the axis of the lens, the position of the image is always between the lens and the object. [3 M]
   (i) Name the lens.
   (ii) Draw a ray diagram to show the formation of the image of an object placed in front of the lens at any position of your choice except infinity.
4. An object AB is placed between $2F_1$ and F_1 on the principal axis of the convex lens as shown in the diagram below: [4 M]



   Copy the diagram and using three rays starting from point A, obtain the image of the object formed by the lens.
5. An object is placed in front of a lens between its optical centre and the focus and forms a virtual, erect and diminished image. [4 M]
   (i) Name the lens which forms this image.
   (ii) Draw a ray diagram to show the formation of the image with the above stated characteristics.

Chapter 6: Spectrum

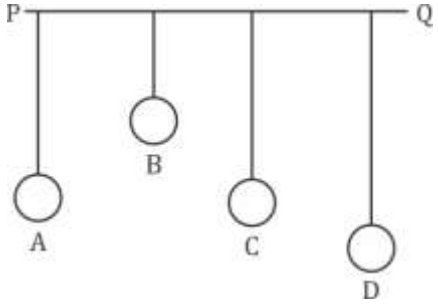
1. [2 M]
   (i) Name a prism required for obtaining a spectrum of Ultraviolet light.
   (ii) Name the radiations which can be detected by a thermopile.
2. [3 M]
   Name the radiations:
   (i) That are used for photography at night.
   (ii) That are used for detection of fracture in bones.

(iii) Whose wavelength ranges from 100 Å to 4000 Å (or 10 nm to 400 nm).

3. A type of electromagnetic wave has wavelength 50 Å [3 M]
   (i) Name the wave.
   (ii) What is the speed of the wave in vacuum?
   (iii) State one use of this type of wave.

Chapter 7: Sound

1. [2 M]
   (i) State the safe limit of sound level in terms of decibel for human hearing.
   (ii) Name the characteristic of sound in relation to its waveform.
2. Radar sends a signal to an aeroplane at a distance 45 km away with a speed of 3×10^8 ms^{-1}. After how long is the signal received back from the aeroplane? [2 M]
3. [3 M]
   (i) A man standing between two cliffs produces a sound and hears two successive echoes at intervals of 3 s and 4 s respectively. Calculate the distance between the two cliffs. The speed of sound in the air is 330 ms^{-1}.
   (ii) Why will an echo not be heard when the distance between the source of the sound and the reflecting surface is 10 m?
4. [4 M]
   (i) What is meant by the terms (a) amplitude and (b) frequency of a wave?
   (ii) Explain why stringed musical instruments, like the guitar, are provided with a hollow box.
5. In the diagram below, A, B, C, D are four pendulums suspended from the same elastic string PQ. The length of A and C are equal to each other while the length of pendulum B is smaller than that of D. Pendulum A is set in to a mode of vibrations. [4 M]



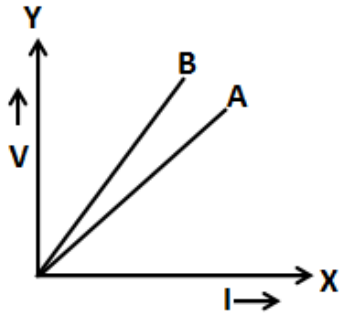
(i) Name the type of vibrations taking place in pendulums B and D?

(ii) What is the state of pendulum C?

(iii) State the reason for the type of vibrations in pendulum B and C.

Chapter 8: Current Electricity

1. The V-I graph for a series combination and for a parallel combination of two resistors is shown in the figure below. Which of the two A or B. represents the parallel combination? Give reasons for your answer. [2 M]

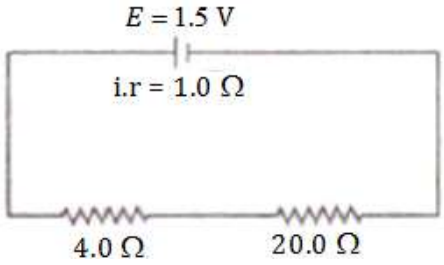


2. [2 M]

(i) State Ohm's law.

(ii) A metal wire of resistance 6 Ω is stretched so that its length is increased to twice its original length. Calculate its new resistance.

3. A cell of e.m.f. 1.5 V and internal resistance 1.0 Ω is connected to two resistors of 4.0 Ω and 20.0 Ω in a series as shown in the figure drawn below: [3 M]



Calculate the:

(i) Current in the circuit.

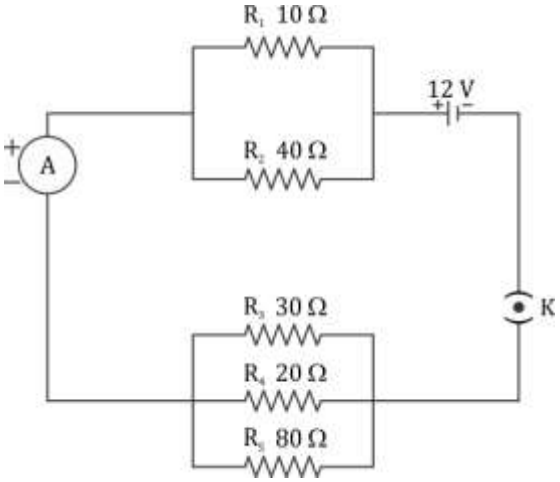
(ii) Potential difference across the 4.0 ohm resistor.

(iii) Voltage drop when the current is flowing.

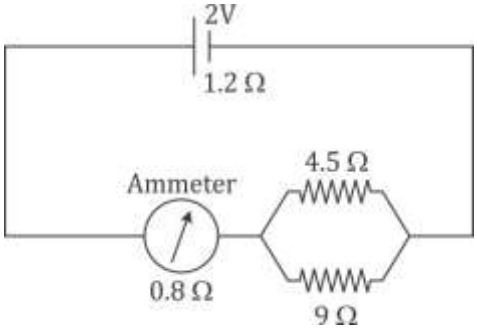
(iv) Potential difference across the cell.

4. [3 M]
   (i) Draw a graph of Potential difference (V) versus Current (I) for an ohmic resistor.
   (ii) How can you find the resistance of the resistor from this graph?
   (iii) What is a non-ohmic resistor?

5. Five resistors of different resistances are connected together as shown in the figure below. A 12 V battery is connected to the arrangement. Calculate: [4 M]
   (i) The total resistance of the circuit.
   (ii) The total current flowing through the circuit.



6. A cell of Emf 2 V and internal resistance 1.2 Ω is connected with an ammeter of resistance 0.8 Ω and two resistors of 4.5 Ω and 9 Ω as shown in the diagram below: [4 M]



   (i) What would be the reading on the Ammeter?
   (ii) What is the potential difference across the terminals of the cell?

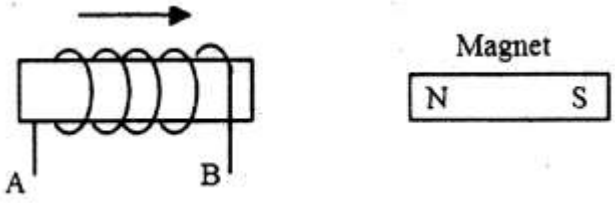
Chapter 9: Electrical Power and Household Circuits

1. Of the three connecting wires in a household circuit: [2 M]
   (i) Which of the two wires are at the same potential?
   (ii) In which of the three wires should the switch be connected?
2. An electric heater is rated 1000 W – 200 V. Calculate: [2 M]
   (i) The resistance of the heating element.
   (ii) The current flowing through it.
3. [3 M]
   (i) Name the transformer used in the power transmitting station of a power plant.
   (ii) What type of current is transmitted from the power station?
   (iii) At what voltage is this current available to our household?
4. [3 M]
   (i) What is meant by the earthing of an electrical appliance? Why is it essential?
   (ii) What will be the effect on the working of an electric bell, if instead of a direct current, an alternating current is used?
5. [4 M]
   (i) In what unit does the domestic electric meter measure the electrical energy consumed? State the value of this unit in the S.I. Unit.
   (ii) Why should switches always be connected to the live wire?
   (iii) Give one precaution that should be taken while handling switches.

Chapter 10: Electro-magnetism

1. [2 M]
   (i) What is an A.C. generator or Dynamo used for?
   (ii) Name the principle on which it works.
2. [3 M]
   (i) What is the name given to a cylindrical coil whose diameter is less in comparison to its length?
   (ii) If a piece of soft iron is placed inside the current carrying coil, what is the name given to the device?
   (iii) Give one use of the device named by you in (b) (ii) above.

3. [3 M]
   (i) Draw a neat and labelled diagram to show the structure of an A.C. generator.
   (ii) State the energy conversion taking place in the generator when it is working.
4. [4 M]
   (i) Name two factors on which the magnitude of an induced e.m.f. in the secondary coil depends.
   (ii) In the following diagram, an arrow shows the motion of the coil towards the bar magnet.



   a. State in which direction the current flows, from A to B or from B to A?
   b. Name the law that was used to come to this conclusion.

Chapter 11: Calorimetry

1. A hot solid of mass 60 g at 100 °C is placed in 150 g of water at 20 °C. The final steady temperature recorded is 25 °C. Calculate the specific heat capacity of the solid. [Specific heat capacity of water = 4200 J $kg^{-1}\,{}^{0}C^{-1}$] [2 M]
2. [2 M]
   (i) Name a gas caused by the Greenhouse effect.
   (ii) Which property of water makes it an effective coolant?
3. [3 M]
   (i) It is observed that the temperature of the surrounding starts falling when the ice in a frozen lake starts melting. Give a reason for the observation.
   (ii) How is the heat capacity of the body related to its specific heat capacity?
4. 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 the phase. Label the different parts of your graph. [3 M]
5. A calorimeter of mass 50 g and specific heat capacity 0.42 J $g^{-1}\,°C^{-1}$ contains some mass of water at 20 °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 22 °C.

Find the mass of water used in the calorimeter.
[Specific heat capacity of the metal piece = 0.3 J g^{-1} °C^{-1}
Specific heat capacity of water = 4.2 J g^{-1}°C^{-1}] [4 M]

6. A refrigerator converts 100 g of water at 20°C to ice at –10°C in 35 minutes. Calculate the average rate of heat extraction in terms of watts.
Given: Specific heat capacity of ice = 2.1 J g^{-1}°C^{-1}
Specific heat capacity of water = 4.2 J g^{-1}°C^{-1}
Specific latent heat of fusion of ice = 336 J g^{-1} [4 M]

Chapter 12: Thermionic Emission and Radioactivity

1. Which of the radioactive radiations [2 M]
   (i) Can cause severe genetic disorders?
   (ii) Are deflected by an electric field?
2. Complete the following nuclear changes: [2 M]
   (i) $^{24}_{11}NA \rightarrow {}^{\cdots\cdots}_{\cdots\cdots}Mg + {}^{0}_{-1}\beta$
   (ii) $^{238}_{92}U \rightarrow {}^{234}_{90}Th + \ldots\ldots + Energy$
3. In a cathode ray tube, state: [3 M]
   (i) The purpose of covering the cathode by thorium and carbon.
   (ii) The purpose of the fluorescent screen.
   (iii) How is it possible to increase the rate of emission of electrons?
4. Arrange α, β, and γ rays in ascending order with respect to their [3 M]
   (i) Penetrating power.
   (ii) Lionising power.
   (iii) Biological effect.
5. [4 M]
   (i) What happens to the atomic number of an element when it emits:
      (a) An alpha particle.
      (b) A beta particle.
   (ii) Explain why alpha and beta-particles are deflected in an electric or a magnetic field but gamma rays are not deflected in such a field.