

# I-PRE BOARD EXAMINATION

## SCIENCE PAPER-1

### PHYSICS

(Maximum Marks: 80)

(Time allowed: Two hours)

Answer to this paper must be written on the paper provided separately.

You will not be allowed to write during first 15 minutes.

This time must be spent in reading the question paper..

The time given at head of this paper is the time allowed for writing the answers.

Section-A is compulsory. Attempt any four questions from Section-B.

The intended marks for the questions are given in the brackets [ ].

### SECTION- A

(Attempt all questions from this section.)

Question 1

[15]

Choose the correct answers to the questions from the given options.

(Do not copy the questions. Write the correct answers only.)

(i) The ratio of SI to CGS unit of force is : [1]

(a)  $10^5$

(b)  $10^6$

(c)  $10^7$

(d)  $10^{-5}$

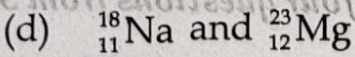
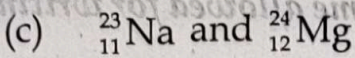
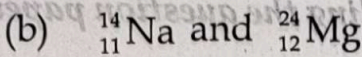
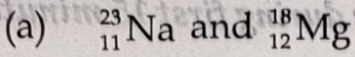
This paper consists of 10 printed pages.

Turn Over

(ii) A singly ionised helium atom is formed when :

- (a) an alpha particle  $\text{He}$  gains one electron.
- (b) an alpha particle  $\text{He}^{2+}$  gains two electrons.
- (c) an alpha particle  $\text{He}^{2+}$  gains one electron.
- (d) an alpha particle  $\text{He}$  loses one electron.

(iii) Select the example of isotones among the give options :



(iv) A strong current is passed through a freely suspended solenoid. The

solenoid is disturbed so that it is free to revolve around the vertical axis. The solenoid will come to rest in :

(a) North-south direction

(b) East-West direction

(c) In any direction

(d) None of these

(v) 200 g of ice at  $0^\circ\text{C}$  needs ..... heat to melt. (specific latent heat

of ice =  $336000 \text{ J kg}^{-1}$ )

(a) 6720 J

(b) 67200 J

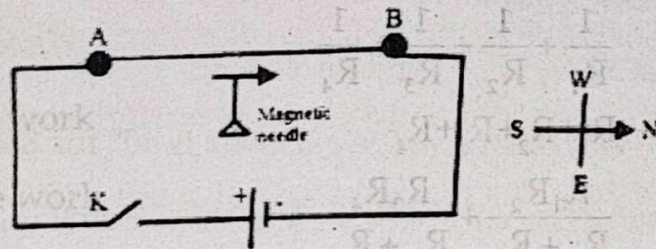
(c) 672000 J

(d) 67.2 J

(vi) During refraction, we get angle of deviation  $\angle \delta = \angle i - \angle r$  when : [1]

- (a) refracted ray goes back to the same first medium.
- (b) refracted ray bends towards the normal
- (c) refracted ray passes undeviated
- (d) refracted ray bends away from normal

(vii) A conductor AB is kept along north south direction of the earth above a magnetic needle as shown in figure when the key is closed then : [1]

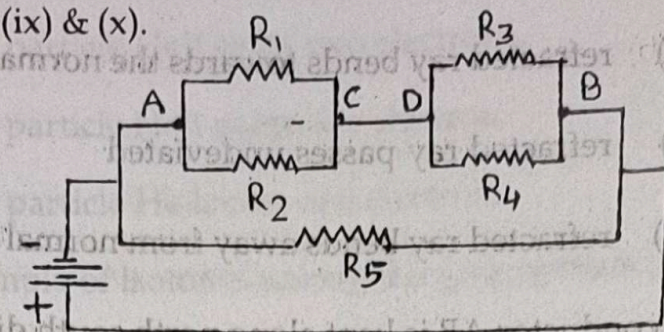


- (a) the needle will not show any deflection.
- (b) the needle will deflect towards west
- (c) the needle will deflect towards east
- (d) the needle will turn in opposite direction i.e. towards south

(viii) In case of pure substances : [1]

- (a) melting point > boiling point
- (b) melting point < boiling point
- (c) melting point = boiling point
- (d) all above parts are correct

For given combination of resistors  $R_1, R_2, R_3, R_4$  and  $R_5$  select the correct options for part (ix) & (x).



(ix) Total resistance between points 'A' and 'B' is :

- (a)  $\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \frac{1}{R_4}$
- (b)  $R_1 + R_2 + R_3 + R_4$
- (c)  $\frac{R_1 R_2}{R_1 + R_2} + \frac{R_3 R_4}{R_3 + R_4}$
- (d)  $\frac{R_1 + R_3}{R_1 R_3} + \frac{R_2 + R_4}{R_2 R_4}$

(x) Potential difference is same across resistors :

- (a)  $R_1, R_3$  and  $R_5$
- (b)  $R_1$  and  $R_3$
- (c)  $R_2$  and  $R_5$
- (d)  $R_3$  and  $R_4$

(xi) A boy of mass 40 kg climbs up a flight of 30 steps each of 30 cm in 2 minutes and a girl of mass 30 kg does the same in 1.5 minutes.

Power developed by them will be in ratio :

- (a) 4 : 3
- (b) 1 : 1
- (c) 3 : 4
- (d) 2 : 3

(xii) The deviation produced by an equilateral prism does not depend on : [1]

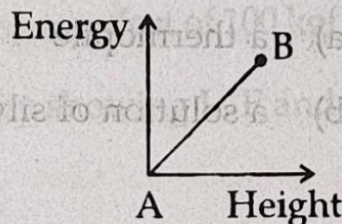
- (a) the angle of incidence
- (b) the material for the prism
- (c) the size of the prism
- (d) the colour of the light used

(xiii) A coolie raises a load upwards against the force of gravity then work done by the load is : [1]

- (a) zero
- (b) positive work
- (c) negative work
- (d) none of these

(xiv) In the given graph of height v/s energy, line AB represents : [1]

- (a) kinetic energy
- (b) total energy
- (c) potential energy
- (d) loss in potential energy



(xv) Which of the following is not the unit of magnetic field : [1]

- (a)  $\text{NA}^{-1} \text{m}^{-1}$
- (b) weber
- (c) weber/metre<sup>2</sup>
- (d) tesla (T)

Question 2

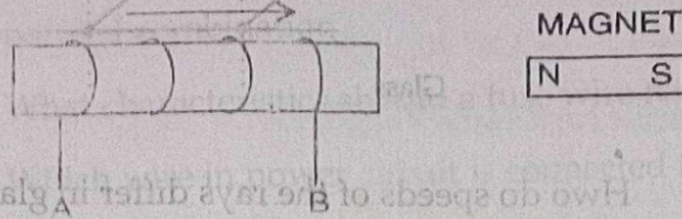
(i) (a) What is the relation between angle of incidence and angle of refraction ? [1]

- (b) What is the other name of principle of method of mixtures ? [1]
- (c) A radioactive nucleus emits a beta particle. Does the position of daughter nucleus changes in a periodic table as compared to the parent nucleus. [1]
- ii) Torque and work both are measured in N-m. Work is measured in Joules. Can torque be also measured in Joule ? Why or why not ? [2]
- (iii) A wire of resistance  $9\Omega$  having length 30 cm is tripled on itself. What is its. new resistance ? [2]
- (iv) Define couple. [2]
- (v) Can  $MA > VR$  ? Why or why not ? [2]
- (vi) The critical angle for glass-air is  $45^\circ$  for the light of yellow colour. State whether it will be less than, equal to, or more than  $45^\circ$  for  
(a) red light (b) blue light ? [2]
- (vii) Name the radiation which can be detected by  
(a) a thermopile  
(b) a solution of silver chloride [2]

### Question 3

- (i) Write two properties of ultrasonic waves which make it suitable for their wide use. [2]
- (ii) A heater is marked 2.5 KW-250V. Calculate the running cost for 2 hrs at the rate of Rs. 0.60 per unit. [2]
- (iii) At what (i) voltage and (ii) frequency is the a.c. supplied to our houses ? [2]
- (iv) State energy change in the following :  
(a) rise in temperature on heating.  
(b) melting [2]

- (v) (a) In what direction does the induced current flow in the coil ?  
 (b) Name the law used to arrive at the conclusion in part (i). [2]



### SECTION-B

(Attempt any four questions)

#### Question 4

- (a) The centre of gravity of a metre scale of mass 80 g lies at the 45 cm mark. It is pivoted at 60 cm mark. What weight should be suspended at its one end to keep the rule horizontal ? Also draw a diagram of the arrangement. [3]

- (b) A pulley system with a velocity ratio 4 is used to lift a load of 300 kgf to a vertical height of 10 m by applying an effort of 100 kgf downwards.

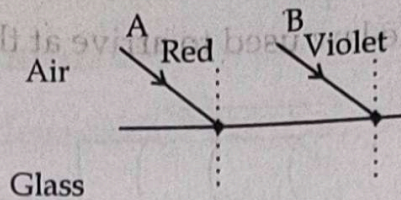
- (i) Draw the arrangement of pulley showing L, E and T in each strand. [2]  
 (ii) Find the efficiency of the pulley system and the work done by the effort. [1]

- (c) A ball of mass 10 g falls from a height of 5 m. It rebounds from the ground to a height of 4m. Find :

- (i) the initial PE of the ball.  
 (ii) the KE of the ball just before striking the ground.  
 (iii) the KE of the ball after striking the ground.  
 (iv) the loss in KE on striking the ground. (Take  $g=9.8 \text{ ms}^{-2}$ ) [4]

Question 5

(a)



(i) How do speeds of the rays differ in glass in adjacent diagram? [1]

(ii) Are the two refracted rays parallel in glass? Give reason. [2]

(b) Draw a ray-diagram to show the refraction of a ray through a prism when it suffers minimum deviation. How is the angle of emergence related to the angle of incidence in this position. [3]

(c) An object of height 2 cm is placed in front of a convex lens of focal length 20 cm at a distance of 15 cm from it. Find the position and magnification of the image. What will be power of the lens? [4]

Question 6

(a) What are damped vibrations? How do they differ from the free vibrations? Give one example of each. [3]

(b) Write characteristics of sound associated with: [3]

(i) wave-form

(ii) frequency

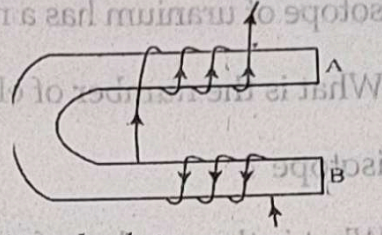
(iii) amplitude

(c) A boy stands 60 m in front of a tall wall and claps. The boy continues to clap every time an echo is heard. Another boy finds that the time between first and fifty-first clap is 18 sec. Calculate the speed of sound. [4]

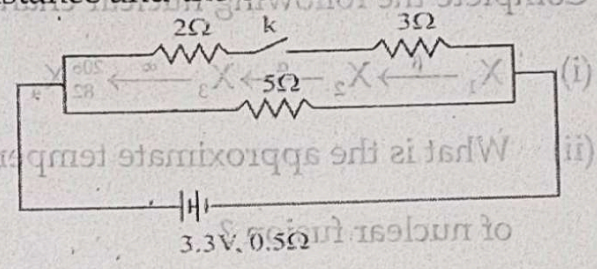


Question 7

- (a) (i) Write one advantage of connecting electrical appliances in parallel combination. [1]
- (ii) What characteristics should a fuse wire have? [1]
- (iii) Which wire in power circuit is connected to the metallic body of the appliance. [1]
- (b) (i) State polarities developed at the ends A and B in adjacent diagram? [2]
- (ii) Name one device which uses horseshoe electromagnet. [1]



- (c) In the adjacent circuit, calculate: [1]
- (i) the resistance of the circuit when the key is open. [1]
- (ii) the current drawn from the cell when the key is open. [1]
- (iii) the resistance and the current when key is closed. [2]



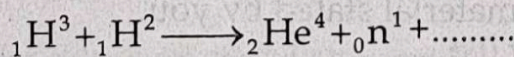
Question 8

- (a) Name the material of which calorimeter is made of. Give two reasons for using the material stated by you. [3]
- (b) (i) Heat supplied to a solid changes it in to a liquid. What is this change in phase called? [3]
- (ii) During the phase change, does the average kinetic energy of the molecules of substance increase? [3]
- (iii) What is energy absorbed during phase change called?

- (c) A vessel of mass 100 g contains 150 g of water at 30°C. How much ice is needed to cool it to 5°C ? Take specific heat capacity of material of vessel = 0.4 J g<sup>-1</sup> k<sup>-1</sup> , specific latent heat of fusion of ice = 336 J g<sup>-1</sup> , specific heat capacity of water = 4.2 J g<sup>-1</sup> k<sup>-1</sup> . [4]

### Question 9

- (a) (i) What is meant by radioactivity? [3]  
 (ii) What is meant by nuclear waste ?  
 (iii) Suggest one effective process for safe disposal of nuclear waste.
- (b) One isotope of uranium has a mass number 235 and atomic number 92 :  
 (i) What is the number of electrons in the neutral atom of this isotope ? [1]  
 (ii) What is the number of protons and number of neutrons in its nucleus ? [1]  
 (iii) Do all isotopes have same number of neutrons. [1]
- (c) Complete the following nuclear changes:  
 (i)  $X_1 \xrightarrow{\beta} X_2 \xrightarrow{\alpha} X_3 \xrightarrow{\gamma} {}_{82}^{206}X_4$  [2]  
 (ii) What is the approximate temperature required for the process of nuclear fusion ? [1]  
 (iii) complete the reaction [1]



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