



Shri Vile Parle Kelavani Mandal's
C.N.M. School & N.D. Parekh Pre-Primary School
Second Preliminary Examinations (2007-08)

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Std: 10

Subject: Physics

Date:

Max. Marks: 80

Time: 1½ hrs

Answers to this paper must be written on the paper provided 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.

This paper consists of _____ pages.

This paper is divided into TWO Sections, Section- A and Section- B

Answer All questions from Section-A and any FOUR questions from Section-B

The intended marks for questions or parts of questions are given in brackets ().

All workings including rough work must be clearly shown and must be done on the same sheet as the rest of the answers. Omission of essential working may result in the loss of marks.

Mathematical tables are provided.

(Section- A)

Attempt all questions from this section

Question No. 1

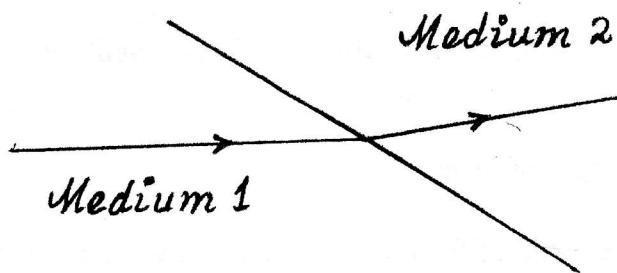
- (a) What happens to the kinetic energy when the mass of the body is doubled but the velocity is reduced to half? (2)
- (b) What are the conditions for the formation of an echo? (2)
- (c) What power is produced by a machine which lifts a mass of 2kg through a vertical height of 10m in 2s? ($g = 10\text{ms}^{-2}$) (2)
- (d) A mass of 3kg is thrown vertically upwards with a kinetic energy of 600J. To what height will it rise? ($g = 10\text{ms}^{-2}$) (2)
- (e) Define the term specific heat capacity and state its SI unit. (2)

Question No. 2

- (a) Write down a formula for each of the following :
- the potential energy of an object of mass m at a height h above sea level.
 - the kinetic energy of an object of mass m moving with a speed of v .
 - the electrical energy used by an immersion heater of resistance R carrying a current of I for a time t .
 - the heat given out when a solid of mass m and specific heat capacity s cools through a temperature drop of θ . (4)
- (b) A current of 2 ampere passes through a conductor and produces 80 J of heat in 10 seconds. Find the resistance of the conductor? (2)
- (c) Explain why drinks get cooled more quickly by adding pieces of ice at 0°C than the ice cold water at 0°C . (2)
- (d) Define threshold energy of a metal. What is its unit? (2)

Question No. 3

(a)



The diagram shows a ray of light crossing an interface between two different media. Which of the following statements is / are correct ?

- medium 1 could be water and medium 2 could be air.

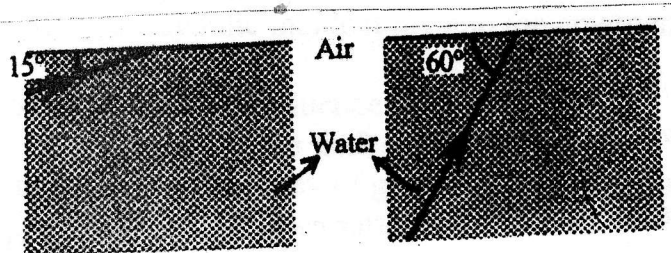
ii. the frequency of the light in medium 1 is greater than the frequency of the light in medium 2.

iii. the velocity of light is greater than the velocity of light in medium 2. (2)

(b) Distinguish between terminal voltage and e.m.f. of a cell. (2)

(c) State Ohm's law. (2)

(d) Redraw and complete the path of the ray of a monochromatic light as shown in the figure given below till it emerges. (critical angle of water is 48.5°) (2)



(e) When a ray of light passes from air to glass, what properties of the light

i. remains constant

ii. vary? (2)

Question No. 4

(a) Differentiate between musical sound and noise. (2)

(b) An isotope of carbon ($A = 14$, $Z = 6$) decays by β emission into nitrogen ($A = 14$, $Z = 7$). Write the corresponding equation for the decay. What is the change in the no. of neutrons in the nucleus? (2)

(c) Write the meaning of the following terms:

i. thermions

ii. the rate of thermionic emission. (2)

- (d) What do you understand by the statement "Fuse current rating is 5 amperes"? (2)
- (e) If water at 90°C is mixed with an equal mass of ice at 0°C , find the final temperature. (2)

Specific heat capacity of water = $1 \text{ cal g}^{-1} \text{ c}^{-1}$

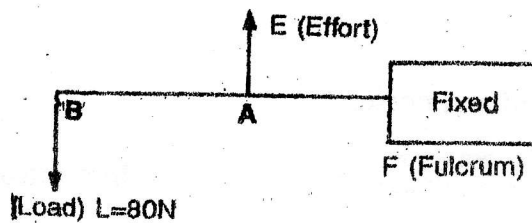
Specific latent heat of fusion of ice = 80 cal g^{-1}

(Section- B)

Attempt any four questions from this section

Question No. 5

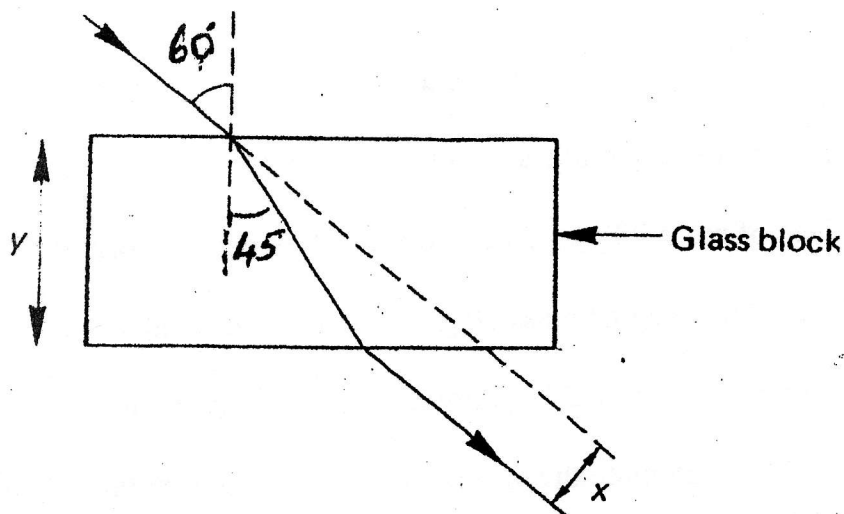
- (a) Derive the expression $F = m a$. The symbols have their usual meanings. (3)
- (b) i. Calculate the work done against gravity by a porter carrying a box of 20 kg on his head and moving 50 m horizontally. ($g = 10 \text{ m/s}^2$) (2)
- ii. Explain the term mechanical advantage. (1)
- (c) The following figure shows a lever which is under the action of a load L and effort E.



- i. State the principle on which the above machine works.
- ii. Give an example of this class of lever.
- iii. If $FA = 60\text{cm}$, and $BF = 3\text{m}$, calculate the minimum effort required to lift the load. (4)

Question No.6

(a)



i. The diagram shows a ray of light passing through a rectangular glass block. The distance between the incident ray and the emergent ray is 'x'. What are the factors which would influence the value of 'x' ?

ii. Calculate the refractive index of glass w.r.t.air applying Snell's law

(by geometrical construction).

(5)

(b) State Snell's law.

(2)

(c) Two ribbons, one pure red and other pure green are in a dark room. They are illuminated first by :

(a) pure green light, (b) pure yellow light & (c) pure blue light.

Describe the appearance of the ribbon in each case.

(3)

Question No. 7

(a) Define latent heat of vapourisation.

(2)

(b) The table below shows the temperature of a liquid in a beaker as it cools in a laboratory.

Temperature / $^\circ\text{C}$	86	60	55	55	55	55	49	41
Time / minutes	0	1	2	3	4	5	6	7

i. Draw a graph of temperature against time.

ii. Explain the shape of the graph. (3)

(c) A metal piece of mass 20 g is heated to a constant temperature of 100°C . Then it is dropped in a calorimeter of mass 50 g and specific heat capacity of $0.42 \text{ J g}^{-1} \text{ K}^{-1}$, containing 50 g of water at 20°C . After stirring the water, the highest temperature recorded is 22°C . Calculate the specific heat capacity of metal.

Specific heat capacity of water = $4.2 \text{ J g}^{-1} \text{ K}^{-1}$ (3)

(d) Explain giving scientific reason : 'Water is used in the radiator of a car'. (2)

Question No. 8

(a) What do you understand by resonance ? Why soldiers are often asked to break their steps while crossing a bridge. (3)

(b) Mira is standing between two hills. She shouts loudly and hears the first echo after 0.5s and the second echo after 1s. What is the distance between the two hills ? (Speed of sound in air is 330 m/s) (4)

(c) State the ways to increase the strength of a current carrying solenoid ? (3)

Question No. 9

(a) Draw a labeled diagram of a simple a.c. generator. (3)

- (b) i. What is an electric motor ? (1)
- ii. A 20000 V alternating e.m.f. is to be stepped down to 400 V using a transformer. What should be the ratio of the no. of turns of the primary coil to that of the secondary coil of this transformer ? (2)
- (c) An auto lamp is marked 12 V and 60 W. Calculate:
- i. The current passing through the bulb when it is used.
- ii. The resistance of the filament of the bulb.
- iii. The energy dissipated in 10 minutes
- (4)

Question No.10

- (a) Radon Rn_{86}^{222} is a radioactive element.
- i. State the meaning of 222 and 86.
- ii. Radon disintegrates with the emission of an α - particle to form a different element. Write down the equation for the nuclear reaction.
- iii. What are the constituents of the nucleus of this element ? (3)
- (b) Choose the correct word or phrase to complete each of the following sentences and re-write the correct sentence.
- i. The (moderator, control rod, coolant) regulates the fission rate of a reactor.
- ii. Hydrogen and its isotopes are raw materials for (nuclear fission, transmutation, nuclear fusion)
- iii. (Coal, Oil, Uranium) is a nuclear fuel.
- iv. Hydrogen is changed to helium in a (fission, fusion, breeder)
- v. A moderator slows (protons, neutrons, electrons) in a chain reaction.