

GREENLAWNS HIGH SCHOOL
PRELIMINARY EXAMINATION YEAR 2016-2017

SUBJECT : PHYSICS
TIME : 2 HOURS

CLASS : X
MARKS : 80

Note – Answers to this paper must be written on the paper provided separately. You will not be allowed to write during the first 10 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.

Section I is compulsory. Attempt any 4 questions from Section II. The intended marks for questions are given in the brackets ().

Section I (40 Marks) Compulsory.

(2 x 5)

Q 1 A) If 'm' is the mass of a body, 'v' its velocity & 'p' the momentum then write a relationship between change in momentum, mass & velocity of the body when –

- i. 'v' is almost equal to 'c', the velocity of light.
- ii. 'v' is very less as compared to 'c' the velocity of light.

B) State the energy changes that take place in the following when they are in use.

- i. A photovoltaic cell
- ii. A thermocouple

C) A person having myopic eye uses a concave lens of focal length 50 cm. What is the power of the lens?

D) Fill in the blanks:

When a beam of white light enters a prism _____ and _____ take place at the first & second surface of it respectively.

E) What is the resistance offered by a 100 W bulb if the line voltage is 220 V.

Q.2

(2 x 5)

A) A uniform metre rule is in equilibrium position as shown in the diagram below. Calculate the mass of the metre rule.

B) Which vibrations – free or damped is very difficult to realise in practice? Why?

C) Copy & complete the following diagram to show the path of ray of monochromatic light as it enters & emerges out of prism. Mark the angles wherever necessary. ($\angle i_c = 42^\circ$)

D) It is said that work done by a machine is always less than the work done on the machine, then what is the use of the machine? (Give 2 points)

E) State two ways how electromagnet can be made stronger.

Q.3 (2 x 5)

A) Calculate the kinetic energy of a body of mass 0.1 kg & momentum 40 kg m/s.

B) State the factor which determines:-

- i) Loudness of sound heard.
- ii) quality of note.

C) Choose the correct option.

- i) According to new convention, the neutral wire is _____.
a) Red b) brown c) light blue d) green
- ii) The other way of writing AV^{-1} is _____.
a) ohm b) mho^{-1} c) siemen d) coulomb

D) Define specific heat capacity & give its SI unit.

E) The nucleus of an element X (Atomic number 92 & atomic mass number 235) emits 2α & 3β particles. The final nucleus is ${}^b Y$. Find a & b.

Q.4 (2 x 5)

A) Distinguish between A.C. generator & D.C. motor (Give any 2 points).

B) Why are infrared radiations preferred over ordinary visible light for taking photographs in fog?

- C) Gear P & Q are used in combination for an experiment. Suggest which should be used as driving gear & which one should be as a driven gear for obtaining the following results.
- i) Gain in speed
 - ii) Gain in torque

D) If a rat & an elephant both run with the same kinetic energy, who will win the race? Why?

E) In terms of radioactivity state which of the emissions are

- i) the most ionizing
- ii) Not deflected by electric or magnetic field.

Section II

Attempt any 4 questions from this section.

Q.5

(3 + 3 + 4)

A) The refractive index of air with respect to glass is defined as ${}_g\mu_a = \frac{\sin i}{\sin r}$

- i) Write down a similar expression for ${}_a\mu_g$ in terms of angles i & r .
- ii) In Q 5 – i above if $\angle r = 90^\circ$, what is corresponding $\angle i$ called.
- iii) What is the physical significance of $\angle i$ as in the part Q 5 ii above.

B) Draw a neat labelled diagram of combination of pulleys using one fixed pulley & other movable pulleys having mechanical advantage = 4. Show the directions of load, effort & tension in each strand.
How much is the effort in equilibrium position for the same system?

C) A 30 g ice cube at 0°C is dropped into 100 g of water at 30°C . Calculate the final temperature of water when the whole ice cube melted. Latent heat of ice = 80 calg^{-1} , specific heat capacity of water = $1 \text{ calg}^{-1} \text{ }^\circ\text{C}^{-1}$

Q.6

(3 + 3 + 4)

A) Observe the figure given below. If the resistance between A & B is 4Ω , find the value of R.

- B) The diagram shows a vibrating tuning fork. It takes $\frac{1}{156}$ th of second the move from A to B. Find
- Time period of the wave
 - Frequency of the wave
 - Is the wave audible to us?

- C) i) Give any 2 factors affecting thermionic emission.
ii) Give any 2 examples of back ground radiations.

Q.7

(3 + 3 + 4)

A) Classify the following pairs of elements into Isotone, Isotope & Isobar.

i) Na, Mg

ii)

iii) Na , Mg

B) Observe the circuit diagram given below & calculate the reading of A when

- K is opened
- K is closed.

- C) i) Draw a ray diagram to show how a converging lens can form an image beyond $2F_2$
ii) Write the nature & the size of the image formed in Q7 C - i.

Q.8

(3 + 3 + 4)

A) Briefly explain a quality/property of any 3 materials that surround a calorimeter, which reduce the heat transfer.

B) Give scientific reasons.

1. A couple is needed while tightening the cap of an inkpot.
2. The base of an electric iron is made thick.
3. The sky appears black in the absence of atmosphere.

C) Observe the diagram given below & answer the questions that follow.

i) What will you observe when -

- a) the magnet is dropped into the coil.
- b) the number of turns of the coil is increased?

ii) What will be the direction of current flowing through the coil when the magnet is dropped in?

iii) State the law which explains this observation.

Q.9

(3 + 3 + 4)

A) Draw a neat labelled ray diagram to show the real & apparent position of an air bubble that is trapped in a rectangular glass block when it is viewed from directly above. From your diagram write an expression that gives refractive index of this glass block.

B) State any three properties that are common to & shown by both beta rays & cathode rays.

C) i) Sometimes when a vehicle is driven, a rattling sound is heard. Explain briefly why this happens.

- i) Give the name of the phenomenon taking place.
- ii) Suggest one way by which rattling sound could be stopped.

Q.10

(3 + 3 + 4)

A) The figure given below shows a monochromatic ray of light entering a glass block from air. Which figure is accurate? Why? Also name the phenomenon shown in the figure.

B) Tom fires a gun towards a hill & hears its echo after 5 second. He then moves 320 m towards the hill & fires his gun again. This time he hears the echo after 3 second. Calculate the velocity of sound.

C) Define:

- i) Dispersion
- ii) Super conductor
- iii) Global warming
- iv) Thermionic emission