

GREENLAWNS HIGH SCHOOL

PHYSICS PRELIMINARY EXAMINATION 2024-25

STD.10

TIME: 2 HR.

DATE:09/01/2025

MARKS: 80

NOTE:

- 1] Answer to this paper must be written on the paper provided separately.
- 2] You will not be allowed to write during the first 10 minutes. This time is to be spent in reading the paper.
- 3] The time given at the head of this paper is the time allowed for writing the answers. This paper has 9 pages.
- 4] Section A is compulsory. Attempt any 4 questions from Section B.
- 5] The intended marks for a question or parts of questions are given in the brackets [].

SECTION A [40 MARKS]

ALL QUESTIONS IN THIS SECTION ARE COMPULSORY.

QUESTION 1

Choose the most correct answers to the questions from the given options: [15]

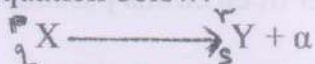
i) For an object placed at a distance 20 cm in front of a convex lens, the image is at a distance 20 cm behind the lens. Then the focal length of convex lens is
a) 20 cm b) 10 cm c) 15 cm d) 40 cm

ii) The rate at which the electrical energy is supplied by the source is
a) electrical voltage b) electrical power c) current d) resistivity

iii) How does a blind person recognize his relative talking to him?

- a) by unique loudness of an individual
- b) by unique amplitude of sound of an individual
- c) by unique waveform of voice of an individual
- d) by unique pitch of sound of an individual

iv) A radioactive nucleus X decays with the emission of an alpha particle as shown in the equation below:



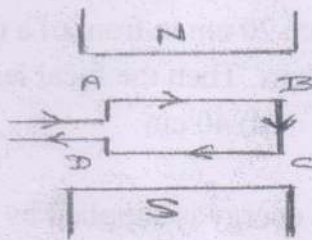
Choose the correct equation from the options given below:

- a) $p = r$ b) $q = s + 1$ c) $p = r + 4$ d) $s = q + 2$

Contd.---

Page 2

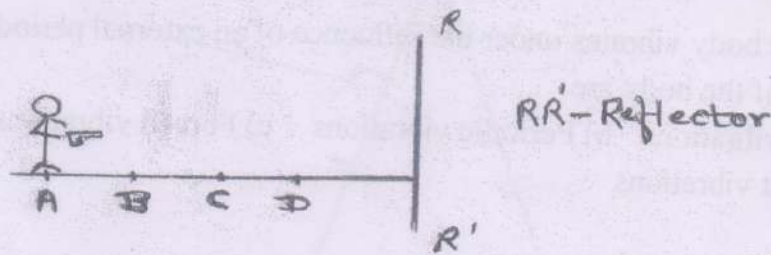
- v) Which of the following is the use of household electric meter?
- a) to record the consumption of current by the lights, fans and TV etc.
 - b) to record the consumption of voltage used.
 - c) to record the consumption of energy used.
 - d) to melt the fuse in case of a short circuit .
- vi) A single fixed pulley and a movable pulley both are separately used to lift a load to the same height then the ratio of their efforts applied is
- a) 1:3 b) 2:1 c) 1:3 d) cannot be determined
- vii) Which of the following liquids is most suitable for radiators in the car?
- a) Liquid P with specific heat capacity $1.5 \text{ J/g}^\circ\text{C}$
 - b) Liquid Q with specific heat capacity $2000 \text{ J/kg}^\circ\text{C}$
 - c) Liquid R with specific heat capacity $3 \text{ J/g}^\circ\text{C}$
 - d) Liquid S with specific heat capacity $4000 \text{ J/kg}^\circ\text{C}$
- viii) If the current in the wire is towards left from A to B, what will be the direction of force experienced by the wire at AB?



- a) perpendicular to the plane of paper and outwards
 - b) perpendicular to the plane of paper and inwards
 - c) In the plane of the paper and downwards
 - d) In the plane of the paper and upwards
- ix) Which of the following remains constant in refraction?
- a) wavelength b) frequency c) speed d) amplitude
- x) One ampere is equal to _____ number of electrons passing through a conductor in one second.
- a) 6.25×10^{20} b) 0.625×10^{18} c) 6.25×10^{-19} d) 0.625×10^{19}

Contd.---

xi) A man stands at four different positions A, B, C and D in front of a reflector and makes some sound. The time taken for sound to reach the reflector from positions A, B, C and D are 0.15s, 0.07s, 0.06s and 0.03s respectively. At which position/s will the man hear the echo?



- a) A b) A and B c) A, B and C d) A, B, C and D

xii) A student did research on V-I characteristics of different materials. The observation table for two different materials is given as below:

Sr No.	Material A		Material B	
	Potential Difference V_A (V)	Current I_A (A)	Potential Difference V_B (V)	Current I_B (A)
1	0.8	0.04	8	0.2
2	1.0	0.08	10	0.4
3	1.2	0.12	12	0.6
4	1.4	0.16	14	1.0
5	1.6	0.20	16	1.6
6	1.8	0.24	18	2.4

The material A and B could be

- a) Silver and LED b) Junction diode and Nichrome
 c) Copper and Iron d) Junction diode and LED

xiii) The radiations suffering the maximum deflection in a magnetic field is

- a) α particles b) β particles c) γ rays d) X rays

Contd.....

- xiv) For a stable equilibrium of a body, its centre of gravity must be
- a) at a point where the algebraic sum of moments of all the particles constituting the body is maximum.
 - b) below the base and near the geometric centre.
 - c) at the base.
 - d) above the base and near the geometric centre.
- xv) When a body vibrates under the influence of an external periodic force, the vibrations of the body are
- a) Natural vibrations b) Periodic vibrations c) Forced vibrations
 - d) Resonant vibrations

QUESTION 2

A] State the physical quantities whose units are given below: [2]

- i) tesla ii) Jkg^{-1}

B] i) Which force is responsible for the circular motion of a body? [2]

ii) Is there a transfer of energy when the body is moving in a circular path?

Why do you say so?

C] 25 g of metal ball at 25°C requires 2775 J of heat energy so as to attain a temperature of 325°C . Calculate the specific heat capacity of the metal. [2]

D] Name the material used for: [2]

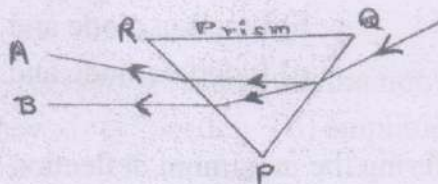
- i) Electric fuse ii) Heating element of an electric oven

E] i) State the principle of method of mixtures. [2]

ii) Name the law on which the above mentioned principle is based.

F] A ray of light is striking on a prism PQR as shown in the figure. Observe the figure and answer the following questions: [2]

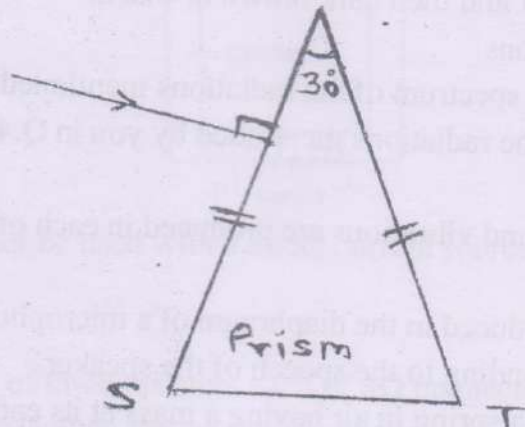
- i) Identify the colours indicated as A and B.
- ii) Which colour will have minimum value of angle of deviation?



G] What are background radiations? Give one example each of an internal source and external source of these background radiations. [3]

QUESTION 3

A] Copy and complete the figure given below: [2]
 Show the path of the ray of monochromatic light as it enters and emerges out of the prism. Mark the angles wherever necessary. (Critical angle 42°)



B] A type of single pulley is very often used as a machine even though it does not give any gain in Mechanical advantage. [2]

- i) Name the type of pulley used.
- ii) For what purpose is such a pulley used?

C] State the conditions for the magnitude of a force on a current carrying conductor placed in a magnetic field to be [2]

- i) Zero
- ii) Maximum (Consider the current is flowing through the conductor in both the cases)

D] Why water is used as an effective coolant? [2]

E] Name the following: [2]

- i) The phenomenon in which an e.m.f. is induced in a coil if there is change in the magnetic flux linked with the coil.
- ii) The process of absorption and then re-emission of light by the dust particles and the air molecules present in the atmosphere.

SECTION B (40 MARKS)

ATTEMPT ANY 4 COMPLETE QUESTIONS FROM THIS SECTION

QUESTION 4

A] Certain electromagnetic radiations change the paper dipped in silver chloride solution first to violet and then dark brown or black. [3]

- i) Identify the radiations.
- ii) How to obtain the spectrum of the radiations mentioned by you in Q.4 A-i ?
- iii) Give one use of the radiations mentioned by you in Q.4 A-i

B] Which type of sound vibrations are produced in each of the following cases: [3]

- i) The vibrations produced in the diaphragm of a microphone sound box with frequencies corresponding to the speech of the speaker.
- ii) The vibrations of a spring in air having a mass at its end.
- iii) The vibrations produced in a machine which is responsible for a rattling sound.

C] A house has main fuse of 5A rating. 5 bulbs each of 40W and 3 tube lights of 60W each are used simultaneously. Find: [4]

- i) The current drawn from the mains of 220 V
- ii) The number of additional bulbs each of 100W which can also be lighted on a festival day.

QUESTION 5

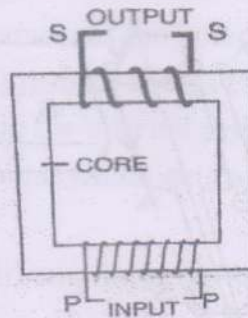
A] Two forces of 5N each acting in the upward direction are placed along the two ends of a uniform scale pivoted at the centre of the scale of length 80 cm. [3]

- i) Draw the diagram of the above arrangement.
- ii) Calculate the net moment of force acting on the body.

B] i) State two conditions necessary for total internal reflection to occur. [3]
ii) Give any one point to justify the use of total internal reflecting prism in place of a plane mirror.

C] i) Give one similarity and one difference between the d.c. motor and A.C. generator. [4]

ii) Identify the type of a transformer from the figure given below:



iii) Can a transformer be used with a direct current source? Justify your answer.

QUESTION 6

A] Draw a diagram of three resistors each of 8Ω connected in parallel combination. Also calculate the resultant resistance of the combination you have drawn. [3]

B] To which type of a lever the following machines belong to: [3]

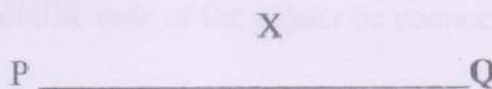
i) Wheel barrow ii) Handle of a water pump iii) Foot treadle.

C] A platinum ball of mass 100g is removed from a furnace and immediately immersed in a copper calorimeter of 100g containing water of mass 340g at 30°C . The temperature of water then raised to 40°C . Calculate the temperature of the furnace. [4]

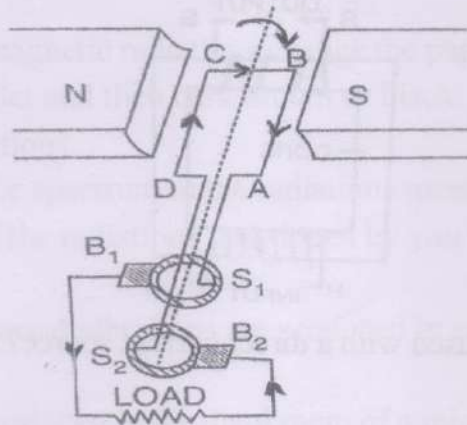
(Specific heat capacity of platinum = $168 \text{ Jkg}^{-1}\text{K}^{-1}$, Specific heat capacity of copper = $420 \text{ Jkg}^{-1}\text{K}^{-1}$, Specific heat capacity of water = $4200 \text{ Jkg}^{-1}\text{K}^{-1}$)

QUESTION 7

A] i) In the figure given below, the straight line PQ represents a conductor carrying current. The current produces a magnetic field around the wire. If the magnetic field at point X is outward and perpendicular to the conductor, what is the direction of the current? [1]



ii) Observe the diagram given below and answer the questions that follow [2]



- Identify the device.
- Write the principle on which it works.

B] Write the energy conversion in each of the following cases when they are in working condition. [3]

- Thermocouple
- Loudspeaker
- Automobiles

C] i) Draw a neat labelled ray diagram using a suitable lens which finds its application in Galilean telescope. [4]

- If an object is placed at a distance of 10cm in front of a lens selected by you in the above part of the question, whose focal length is 10cm. Find the position of the image.

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QUESTION 8

- A] i) Define: Internal resistance [3]
ii) A high resistance voltmeter measures the potential difference across a battery to be 18V. On connecting a 48Ω resistor across the terminals of the battery, the voltmeter reads 14.4 V. Calculate the internal resistance of the battery.
- B] Name the characteristic of sound which gets affected by each of the following factors: [3]
i) Frequency ii) wave form iii) amplitude
- C] i) Draw a neat labelled diagram of a block and tackle system of 3 pulleys. [4]
In the diagram mark the directions of all the forces acting on it.
ii) If the above system lifts a load of 150N by an effort of 60N. Calculate its mechanical advantage. Is it an ideal machine?

QUESTION 9

- A] i) Define power. [3]
ii) The heart of an athlete beats 100 times a minute. If the work done by the heart per beat is 1.4J. Calculate the power of the heart.
- B] Identify the radiations from the properties given below: [3]
i) They have large kinetic energy and momentum hence used for transmutation.
ii) They are detected by their heating property and are scattered less due to long wavelength.
iii) They have very low ionising power but high frequency and cause the immense biological damage.
- C] A power circuit uses a cable having three different wires. [4]
i) Name the three different wires of the cable
ii) Between which two wires the heating element of an electric geyser be connected?
iii) To which wire the switch and fuse be connected?
iv) To which wire the metallic case of the geyser be connected?