

GUIDELINES

(By Subrata Sir, Sunny Sir & group of ICSE and CBSE school teachers)

PHYSICS

MOCK PAPER – 1 (2024)

Time: 3 hours

Total Marks: 80

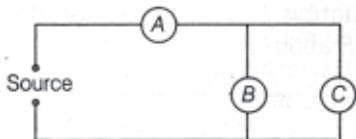
General Instructions:

1. Answers to this Paper must be written on the paper provided separately.
2. You will not be allowed to write during the first 15 minutes. This time is to be spent in reading the question paper.
3. The time given at the head of this Paper is the time allowed for writing the answers.
4. Attempt all questions from Section A, any 4 questions from section B.
5. The intended marks for questions or parts of questions are given in bracket [].

SECTION A

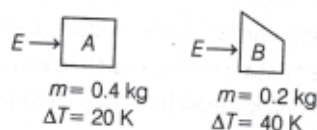
[Attempt all questions from this section]

1. Choose the correct answers to the questions from the given options. (Do not copy the question, write the correct answers only.) [15]
 - (i) A body is moved along a straight road by a machine delivering constant power. The distance moved by the body in time t is proportional to
 - (a) $t^{1/2}$
 - (b) $t^{3/4}$
 - (c) $t^{3/2}$
 - (d) t^2
 - (ii) A radioactive nucleus is represented by ${}_{85}^{227}\text{X}$. It emits a beta particle and forms a different nucleus of element Y. Which of the following represents this new nucleus?
 - (a)
 - (b)
 - (c)
 - (d)
 - (iii) Before playing the orchestra in a music concert, a sitarist adjusts the tension and plucks the strings suitably. In doing this adjusted which characteristics of sound?
 - (a) Intensity of sound only
 - (b) Amplitude of sound only
 - (c) Frequency of sitar with other instruments
 - (d) Loudness of sound
 - (iv) Which of the following is not a representation of moment?
 - (a) $\mathbf{r} \times \mathbf{F}$
 - (b) $\mathbf{F} \cdot \mathbf{r}$
 - (c) Both (a) and (b)
 - (d) Neither (a) nor (b)
 - (v) Three similar bulbs A, B and C are connected to a voltage source as shown in the figure. If C is removed, how will the illumination of A and B be affected?



- (a) Both A and B will become dimmer
 - (b) Both A and B will become brighter
 - (c) A will become dimmer and B will become brighter
 - (d) A will become brighter and B will become dimmer
- (vi) Which of the following does not remain constant in the phenomenon of refraction?
 - (a) Phase
 - (b) Frequency
 - (c) Both (a) and (b)
 - (d) Neither (a) nor (b)
 - (vii) An electric kettle with a 2 kW heater contains 0.25 kg of boiling water. It will take time of before all the water to boil away.
(Take, specific latent heat for steam = 2.0 MJ/kg)

- (a) 250 s (b) 400 s (c) 600 s (d) 850 s
- (viii) The diagram represents two block of copper A and B. The mass of A is two times that of B, When same amount of heat is supplied, the temperature of A rises to half that of rise in B.

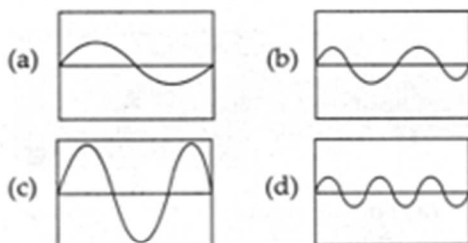


Which statement is correct about above information?

- (a) The specific heat capacity of A is twice that of B.
 (b) The heat capacity of A is same that of B.
 (c) The heat capacity of A is half that of B.
 (d) The heat capacity of A is twice that of B.
- (ix) If a swimmer inside water looks at an aeroplane in the sky, then which one of the following conditions is fulfilled?



- (a) For the swimmer, the aeroplane will appear to be lower than it actually is.
 (b) For the swimmer, the aeroplane will appear to be higher than it actually is.
 (c) For the swimmer, the aeroplane will appear at its actual height.
 (d) For the pilot, the swimmer will appear to be at greater depth than it actually is.
- (x) Kinetic energy of a freely falling body
 (a) continuously decreases (b) continuously increases
 (c) remains constant (d) None of the above
- (xi) A convex lens of focal length 40 cm, a concave lens of focal length 40 cm and a concave lens of focal length 15 cm are placed in contact. The power of the combination in diopter is
 (a) + 1.5 (b) -1.5 (c) + 6.67 (d) -6.67
- (xii) Which of the following phenomena is due to refraction?
 (a) Lateral shift (b) Dispersion of light (c) Twinkling of stars (d) All of the above
- (xiii) Assertion Heater wire must have high resistance and high melting point.
 Reason If resistance is high, the electric conductivity will be less.
 (a) Both Assertion and Reason are true. (b) Both Assertion and Reason are false.
 (c) Assertion is false but Reason is true. (d) Assertion is true but Reason is false.
- (xiv) The diagrams below represent sound waves displayed on the screen of same oscilloscope with the same control settings.
 Which of the following diagram represents softest sound with highest pitch?



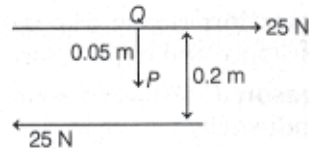
- (xv) A compass needle is placed near one end (A) of a solenoid. When a current is passed through the coil, the compass shows a deflection as the figure given below.



The needle points closer to magnetic north when the

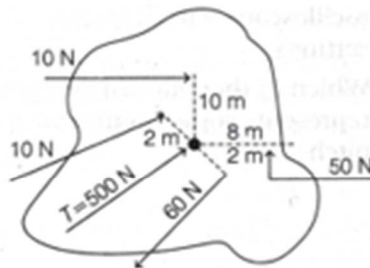
- (e) current in the coil is increased (b) current in the coil is decreased
(c) compass is moved nearer to the coil (d) compass is moved to position B

2. (i) (a) What kind of pulleys are used in block and tackle system. [1]
(b) On what factor does the position of the center of gravity of a body depend? [1]
(c) Mention α , p and y in decreasing order of their ionizing power. [1]
(ii) (a) From the figure, calculate the moment of force about P

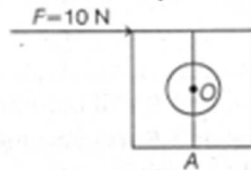


- (b) What do you understand by center of gravity? Give an example, in which center of gravity lies outside the body. [2]

- (iii) (a) Calculate the resultant torque from the following diagram.



- (b) A force is applied on I. a rigid and II. a non-rigid body. How does the effect of the force different in two cases? [2]
(iv) If the moment of F about the center of square is 15 N-m, then find the moment off about A [2]

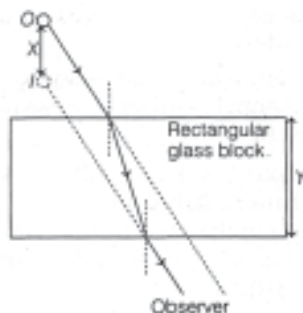


- (v) (a) A body is acted upon by a force. State two conditions under which the work done could be zero. [1]
(b) What is the work done by the moon when it revolves around the earth? [1]
(vi) An observer stands at a distance of 850 m from a cliff and fires a gun. After what time gap will he hear the echo, if sound travels at a speed of 350 m/s in air? [2]
(vii) (a) What causes the potential difference between the two terminals of a cell? [1]
(b) What determines the rate at which energy is delivered by a current? [1]
3. (i) (a) If the lens is placed in water instead of air, how does its focal length change? [1]
(b) Which lens, thick or thin has greater focal length? [1]
(ii) (a) State Ohm's law. [1]
(b) Diagrammatically illustrate how you would connect a key, a battery, a voltmeter, an ammeter, an unknown resistance R and a rheostat, so that it can be used to verify the above law? [1]
(iii) It is established that an electric current, through a metallic conductor produces a magnetic field around it. Is there a similar magnetic field produced around a thin beam of moving
(a) a particle. [1]
(b) neutrons? Justify your answer. [2]
(iv) Which of the radioactive radiations occurs in the following cases
(a) That can cause severe genetical disorder [1]
(b) Are deflected by an electric field? [1]
(v) Define the term calorie. State its relation with joule. [2]

SECTION B

[Attempt any four questions]

3. (i) (a) Why are infrared radiations used for photography in fog? [3]
 (b) Write any other use of infrared radiations. [2]
 (ii) (a) Draw a rays diagram to show 180° deviation with the help of prism. [2]
 (b) What is the name of the prism used? [1]
 (iii)

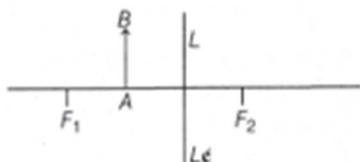


The above diagram shows that an observer sees the image of an object O at I .

- (a) Name and define the phenomenon responsible for seeing the image at a different position. [2]
 (b) State the effect on X when [2]
 I. Y increases
 II. Y decreases
 5. (i) (a) Define power of a lens. [1]
 (b) Write the formula to calculate it. [1]
 (c) What is its SI unit? [1]
 (ii) (a) How are angle of incidence and angle of emergence related when prism is in the position of minimum deviation? [1]

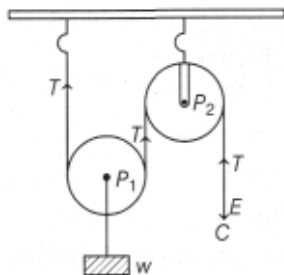


- (b) The critical angle for material of which the equiangular prism ABC (shown in figure) is made, is of 60° . A ray of light incident on the side AB of the prism is refracted along DE such that the angle it makes with the side AC is 150° . Also, $\angle EDB = 90^\circ$. Draw the path of the incident ray on the side AB (which travels along DE) and also the path which the ray DE travels from the point E onwards. [2]
 (iii) (a) Study the given diagram.



- I. Copy and complete the ray diagram showing the formation of the image.
 II. Name the lens LL' used.
 III. State the characteristics of the image formed.
 (b) Name the lens that forms image between F_2 and $2F_2$. [1]
 6. (i) Sachin and Anurag are performing an experiment to verify the principle of moments. Sachin took two pulleys and arranged as shown in diagram. Now, Anurag attached a weight w with pulley E (P_1 is movable pulley and P_2 is fixed pulley).

- (a) If the free end C of the string moves through a distance x , by what distance is the load w raised? [1½]



- (b) What effort E has to be applied at C to just raise the load w -20 kgf? Neglect the weight of the pulley P_1 and the friction. [1½]

- (ii) (a) Iron has specific heat capacity of $0.419 \text{ kJ kg}^{-1} \text{ } ^\circ\text{C}^{-1}$. What can be understood by this statement? [1] (b) Why does temperature of a substance remain constant during melting and vaporization even when heat is being supplied to it continuously? [2]

- (iii) (a) A water pump raises 50 L of water through a height of 25 m in 5 s. Calculate the work done and the power which the pump supplies. (Take, $g = 10 \text{ m/s}^2$, $\rho = 1000 \text{ kg/m}^3$) [2] (b) How is the kinetic energy of a moving cart affected, if I. its mass is doubled and II. its velocity is tripled? [2]

7. (i) (a) What is meant by an echo? Mention one important condition that is necessary for an echo to be heard distinctly. [1½]

(b) 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 taken between the first and fifty first clap is 18 s. Calculate the speed of the sound.

- (ii) (a) What is the nature of p-particles? Explain briefly how p-particles are ejected from the nucleus of an atom. [1½]

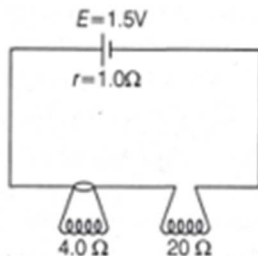
(b) α and p-particles are deflected in an electric or a magnetic field, but γ -rays are not deflected in such a field. Give reason. [1½]

- (iii) A boy tunes a radio channel to a radio station 93.5 MHz. [4]

(a) Name and define the scientific wave phenomenon involved in tuning the radio channel.

(b) Now, what is the frequency of the channel? Convert this frequency into SI unit.

8. (i) In a house, two LED bulbs are connected to a battery. Rahul and Mehul are observing the circuit. They want to calculate current and voltage drop across the resistors.



(a) In the circuit is shown in the diagram. Calculate the current in the circuit.

(b) Calculate the potential difference across the 4.0Ω resistor.

(c) Calculate the voltage drop when the current is flowing. [4]

- (ii) One isotope of uranium has a mass number 235 and atomic number 92.

(a) What is the number of electrons in the neutral atom of this isotope? [1]

(b) What is the number of protons and number of neutrons in its nucleus? [1]

(c) Do all isotopes have the same number of neutrons? [1]

- (ii) (a) Which is the better way to connect lights and other appliances in domestic circuit, series connection or parallel connection? Justify your answer. [2]
 (b) An electrician has made electric circuit of a house in such a way that, if a lamp gets fused in a room of the house, then all the lamps in other rooms of the house stop working. What is the defect in this type of circuit wiring? Give reason. [2]
8. (i) Verify the principle of moments. [3]
 (ii) A vessel of negligible thermal capacity contains 5 kg of water at 50°C . If 5.0 kg of ice at 0°C is added to it, find
 (a) heat energy imparted by water in fall of its temperature from 50°C to 0°C [1]
 (b) mass of ice melted and [1]
 (c) final temperature of mixture. Given, specific heat capacity of water = $4200 \text{ J kg}^{-1}\text{K}^{-1}$, specific latent heat of ice = 336 kJ kg^{-1} . [1]
- (iii) The diagram below shows a magnet placed between two coils A and B. The magnet is moved along the axis towards coil B. [4]
 (a) State the polarities induced at the ends Q and R of the coil due to the motion of the magnet.
 (b) Name the phenomenon due to which the current is induced in the coils.
 (c) Name the law which helps to find the polarities at the ends Q and R.

