## SAMPLIE CONHENH



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## BASED ON LATEST PAPER PATTERN



## Std. XII Science

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- Includes 25 Question Papers \& Activity Sheets (20 Model Papers \& 5 Board Question Papers)
- Created as per the latest paper pattern
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- Complete answer to every question with relevant marks
- Graphs and diagrams provided where applicable
- Includes Mark Booster feature like 'Smart Tip'
- Includes Board Question Papers and Activity Sheet of March 2023 (Solutions provided through QR code)

Scan the adjacent $Q R$ Code to access previous years' Board Question Papers \& Activity Sheets with solutions.


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## PREFACE

HSC is the cornerstone of a student's career as it opens up the doors to turn their dreams into reality. It acts as a platform for students to specialise in a field that interests them the most. However, to achieve this it becomes imperative to get into the details of each subject and to clarify its fundamentals. Adequate knowledge base thus helps students to boost their self-confidence and pave their way up in the final examinations.

It is rightly said, 'Practice makes a man perfect'. Keeping this in mind, we are proud to introduce HSC 25 Question Papers \& Activity Sheets With Solutions. This set of question papers provides students a thorough practice for preparation of their final examinations. The book consists of 20 Model Question Papers and 5 Board Question Papers (March 2023) in all; based on Physics, Chemistry, Mathematics and Statistics, Biology and English (a set of four model question papers for each subject). Along with these question papers, we've provided Model Answers with relevant marks so as to make sure that students understand the importance of each question. Examination Papers of March 2022 and July 2023 along with their solutions are provided through QR Code to offer students a glimpse of the types of questions asked in Board examination.

We have also included Smart Tips which would ensure an overall good score of the students in the examination. Smart Tips serve several purposes such as giving students an insight as to how to approach a question, making them aware of commonly made mistakes, cracking a question by efficient lateral thinking and demonstrating easy methods to cross-verify the answer.

The journey to create a complete book is strewn with triumphs, failures and near misses. If you think we've nearly missed something or want to applaud us for our triumphs, we'd love to hear from you.

Please write to us on: mail@targetpublications.org
A book affects eternity; one can never tell where its influence stops.

## Best of luck to all the aspirants!

Publisher
Edition: Fourth

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Scan the adjacent QR Code to know more about our "Board Questions with Solutions" book for Std. XII (Sci.) and Learn about the types of questions that are asked in the XII Board Examination.


## PHYSICS : PAPER PATTERN

- There will be one single paper of 70 Marks in Physics.
- Duration of the paper will be 3 hours.


## Section A:

(18 Marks)
This section will contain Multiple Choice Questions and Very Short Answer (VSA) type of questions. There will be 10 MCQs and 8 VSA type of questions, each carrying one mark.
Students will have to attempt all these questions.

## Section B:

(16 Marks)
This section will contain 12 Short Answer (SA-I) type of questions, each carrying 2 marks. Students will have to attempt any 8 questions.

## Section C:

This section will contain 12 Short Answer (SA-II) type of questions, each carrying 3 marks.
Students will have to attempt any 8 questions.

## Section D:

This section will contain 5 Long Answer (LA) type of questions, each carrying 4 marks. Students will have to attempt any 3 questions.

## Distribution of Marks According to the Type of Questions

| Type of Questions |  |  |
| :--- | :---: | :---: |
| MCQ | 1 Mark each | 10 Marks |
| VSA | 1 Mark each | 8 Marks |
| SA - I | 2 Marks each | 16 Marks |
| SA - II | 3 Marks each | 24 Marks |
| LA | 4 Marks each | 12 Marks |


| Percentage wise distribution of marks |  |
| :---: | :---: |
| Theory | $63 \%$ |
| Numerical | $37 \%$ |


| No. Topic Name |  | Marks | Marks with option |
| :---: | :--- | :---: | :---: |
| 1 | Rotational Dynamics | 05 | 07 |
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| 11 | Magnetic Materials | 04 | 05 |
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| 13 | AC circuits | 04 | 06 |
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| 15 | Structure of Atoms and Nuclei | 04 | 06 |
| 16 | Semiconductor Devices | 04 | 70 |
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# Model Question Paper - 1 <br> PHYSICS 

Time: 3 Hours
Total Marks: 70

## General instructions:

i. The question paper is divided into four sections.
ii. Section A: Q.No. 1 contains Ten multiple choice type of questions carrying One mark each.
Q. No. 2 contains Eight very short answer type of questions carrying One mark each.
iii. Section B: Q.No. 3 to Q. No. 14 contains Twelve short answer type of questions carrying Two marks each. (Attempt any Eight).
iv. Section C: Q.No. 15 to Q. No. 26 contains Twelve short answer type of questions carrying Three marks each. (Attempt any Eight).
v. Section D: Q.No. 27 to Q. No. 31 contains Five long answer type of questions carrying Four marks each. (Attempt any Three).
vi. Use of log table is allowed. Use of calculator is not allowed.
vii. Figures to the right indicate full marks.
viii. For each MCQ, correct answer must be written along with its alphabet.
e.g., (a)...../ (b)..../ (c).../ (d)..... Only first attempt will be considered for evaluation.
ix. Physical constants:
a. Charge on a proton, $\mathrm{e}=1.6 \times 10^{-19} \mathrm{C}$
b. Acceleration due to gravity, $\mathrm{g}=9.8 \mathrm{~m} / \mathrm{s}^{2}$

## SECTION A

Q.1. Select and write the correct answer:
i. In a series LCR circuit the phase difference between the voltage and the current is $45^{\circ}$. Then the power factor will be
(A) 0.607
(B) 0.707
(C) 0.808
(D) 1
ii. A magnetising field of $2 \times 10^{3}$ ampere $/ \mathrm{m}$ produces a magnetic flux density of $8 \pi$ tesla in an iron rod. The relative permeability of the rod will be
(A) $10^{2}$
(B) $10^{0}$
(C) $10^{4}$
(D) $10^{1}$
iii. Magnetic field of an infinitely long wire is
(A) proportional to current flowing but inversely proportional to distance from wire.
(B) proportional to current flowing and distance from wire.
(C) inversely proportional to current flowing and distance from wire.
(D) proportional to distance from wire but inversely proportional to current flowing.
iv. In a double slit experiment, instead of taking slits of equal widths, one slit is made twice as wide as the other. Then, in the interference pattern
(A) the intensities of both the maxima and the minima increases.
(B) the intensity of the maxima increases and the minima has zero intensity.
(C) the intensity of the maxima decreases and that of the minima increases.
(D) the intensity of the maxima decreases and the minima has zero intensity.
v. One beat means that the intensity of sound should be $\qquad$ .
(A) once maximum
(B) once minimum
(C) once maximum and once minimum
(D) twice maximum and twice minimum
vi. In simple harmonic motion, acceleration of the particle is zero, when its $\qquad$ .
(A) velocity is zero
(B) displacement is zero
(C) both velocity and displacement are zero
(D) both velocity and displacement are maximum
vii. Two hail stones with radii in the ratio of $1: 4$ fall from a great height through the atmosphere. Then the ratio of their terminal velocities is
(A) $1: 2$
(B) $1: 12$
(C) $1: 16$
(D) $1: 8$
viii. The length of a potentiometer wire is 10 m and a potential difference of 2 volt is applied to its ends. If the length of wire is increased by 1 m , the value of potential gradient in volt $/ \mathrm{m}$ will be
(A) 0.18
(B) 0.22
(C) 1.3
(D) 0.9
ix. "Heat cannot by itself flow from a body at lower temperature to a body at higher temperature" is a statement or consequence of
(A) Second law of thermodynamics
(B) Conservation of momentum
(C) Conservation of mass
(D) First law of thermodynamics
x . Which of the following produces uniform electric field?
(A) point charge
(B) linear charge
(C) two parallel plates
(D) charge distributed on circular disc

## Q.2. Answer the following:

i. Define peak value of alternating signal (current or emf).
ii. A potential drop per unit length along a wire is $5 \times 10^{-3} \mathrm{~V} / \mathrm{m}$. If the emf of a cell balances against length 2 m of this potentiometer wire, find the emf of the cell.
iii. How is wavefront related to rays of light?
iv. What are the conditions for system to be in thermal equilibrium?
v. The surface tension of water is $0.072 \mathrm{~N} / \mathrm{m}$. Find the vertical force required to detach a floating pin having length of contact 5 cm from the surface of water.
vi. State formula and S.I. unit of magnetisation.
vii. Obtain dimension of magnetic field.
viii. What are the values of kinetic energy and potential energy at mean position for an oscillating particle?


## Attempt Any Eight:

Q.3. State Faraday's laws of electromagnetic induction.
Q.4. Discuss magnetic field due to a circular current loop at large distances in terms of magnetic moment (m).
Q.5. Write the equation of a simple harmonic progressive wave of amplitude 0.02 m and period 0.04 s travelling along the positive X -axis with velocity of $12.5 \mathrm{~m} / \mathrm{s}$.
Q.6. Two moles of an ideal monatomic gas occupy a volume 3 V at temperature 300 K , it expands to a volume 6 V adiabatically, then what is the final temperature of gas?
Q.7. A solid sphere of mass 10 kg and radius 2 metre is rotating about its diameter. Calculate the radius of gyration of the sphere.
Q.8. Discuss experimental set up for Fraunhofer diffraction using lens.

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## Model Activity Sheet Solution-1

ENGLISH YUVAKBHARATI

Note: Answer to every section must be written on a new page.

## SECTION I

Q.1. (A)
i.

True.
[1 Mark]
ii. False. The writer could see the loudspeaker installed for Keshav Bhalavi's marriage.
[1 Mark]

A2. The first thing the writer did after reaching the village was to take a bath. He then ate to the full and slumped onto the cot to take a nap.
[2 Marks]

A3. The writer had just been through a terrifying experience of getting lost in a jungle full of wild animals and big cats. Ironically, he finds positives from this experience. The incident made him realise that there is still some wilderness left $\dagger$ in our jungles despite the rapid growth in human habitation and industrialisation. According to the writer deforestation has barely left a place where humans can get lost. The incident made him think otherwise and hence he feels that humans are lucky in a way.
[2 Marks]

A4. Couple of years ago, I was accompanying my father to an insurance company building where he had to do some paperwork. The office was on the $7^{\text {th }}$ floor, so we boarded the lift along with three other people. Suddenly the lift broke down and we were stuck somewhere between the $3^{\text {rd }}$ and the $4^{\text {th }}$ floor. A word came around that there was a mechanical fault in the lift. The company staff called in lift technicians who managed to restart the lift, but only after four hours. For four gruelling hours we were stuck in that small lift covered in sweat. The moment we came out of the lift I drank half a litre of water and heaved a huge sigh of relief.
[2 Marks]

A5.
i. A bright red soil trail was found by me. [1 Mark]
ii. After I ate to the full, I slumped onto the cot.
[1 Mark]

A6.
i. in a very short time or very quickly
[1 Mark]
ii. full of energy and enthusiasm
i. $\quad$ True
ii. False. The people emptied their sacks to fill them up with fruits made of gold and silver and flowers studded with gems and jewels.
[1 Mark]

AR.
i.
juicy apples, plump mangoes, ripe pomegranates and colourful flowers that they had never seen before
[1 Mark]
ii. they saw trees laden with apples of gold, mangoes of silver and flowers studded with gems and jewels
[1 Mark]

A3. The crowd was very excited about entering the royal garden. The reasons for the excitement were:
i. No one was usually allowed to enter the royal garden.
ii. The people had heard that the garden was filled with all kinds of beautiful and strange plants.
[1 Mark]

A4. Yes, I think people are naturally greedy and want more and more. They do not seem to be satisfied even though they may have more than enough for their needs at home.
I, too, would be tempted by the precious fruits and flowers of the king's garden. I would want to pick them.
[2 Marks]
AS.
i. a-Article Determiner
lot of - Quantifier Determiner
[1 Mark]
ii. Everyone was usually prohibited from entering the king's special garden.

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# BOARD QUESTION PAPER : FEBRUARY 2023 <br> <br> PHYSICS 

 <br> <br> PHYSICS}

Time: 3 Hours
Total Marks: 70

## General Instructions:

The question paper is divided into four sections:
(1) Section A: Q. No. 1 contains Ten multiple choice type of questions carrying One mark each. Q. No. 2 contains Eight very short answer type of questions carrying One mark each.
(2) Section B: Q. No. 3 to Q. No. 14 contain Twelve short answer type of questions carrying Two marks each. (Attempt any Eight).
(3) Section C: Q. No. 15 to Q. No. 26 contain Twelve short answer type of questions carrying Three marks each. (Attempt any Eight).
(4) Section D: Q. No. 27 to Q. No. 31 contain Five long answer type of questions carrying Four marks each. (Attempt any Three).
(5) Use of the log table is allowed. Use of calculator is not allowed.
(6) Figures to the right indicate full marks.
(7) For each multiple choice type of question, it is mandatory to write the correct answer along with its alphabet. e.g., (a)....../(b)......./(c)......./(d)....... No marks(s) shall be given, if ONLY the correct answer or the alphabet of the correct answer is written. Only the first attempt will be considered for evaluation.
(8) Physical Constants:
(i) $\mathrm{h}=6.63 \times 10^{-34} \mathrm{JS}$
(ii) $\mathrm{c}=3 \times 10^{8} \mathrm{~m} / \mathrm{s}$
(iii) $\pi=3.142$
(iv) $\mathrm{g}=9.8 \mathrm{~m} / \mathrm{s}^{2}$
(v) $\epsilon_{0}=8.85 \times 10^{-12} \mathrm{C}^{2} / \mathrm{Nm}^{2}$
(vi) $\mu_{0}=4 \pi \times 10^{-7} \mathrm{~Wb} / \mathrm{A}-\mathrm{m}$

## SECTION A

Q.1. Select and write the correct answers for the following multiple choice type of questions:
i. If ' $n$ ' is the number of molecules per unit volume and ' $d$ ' is the diameter of the molecules, the mean free path ' $\lambda$ ' of molecules is
(A) $\sqrt{\frac{2}{\pi \mathrm{nd}}}$
(B) $\frac{1}{2 \pi \mathrm{nd}^{2}}$
(C) $\frac{1}{\sqrt{2} \pi \mathrm{nd}^{2}}$
(D) $\frac{1}{\sqrt{2 \pi n d}}$
ii. The first law of thermodynamics is consistent with the law of conservation of $\qquad$ -.
(A) momentum
(B) energy
(C) mass
(D) velocity
iii. $\quad \mathrm{Y}=\overline{\mathrm{A}+\mathrm{B}}$ is the Boolean expression for $\qquad$ .
(A) OR - gate
(B) AND - gate
(C) NOR - gate
(D) NAND - gate
iv. The property of light which remains unchanged when it travels from one medium to another is .
$\qquad$
(A) velocity
(B) wavelength
(C) amplitude
(D) frequency
v. If a circular coil of 100 turns with a cross-sectional area of $1 \mathrm{~m}^{2}$ is kept with its plane perpendicular to the magnetic field of 1 T , the magnetic flux linked with the coil will be $\qquad$ .
(A) 1 Wb
(B) 50 Wb
(C) 100 Wb
(D) 200 Wb
vi. If ' $\theta$ ' represents the angle of contact made by a liquid which completely wets the surface of the container then $\qquad$ -
(A) $\theta=0$
(B) $0<\theta<\frac{\pi}{2}$
(C) $\quad \theta=\frac{\pi}{2}$
(D) $\frac{\pi}{2}<\theta<\pi$
vii. The LED emits visible light when its $\qquad$ .
(A) junction is reverse biased
(B) depletion region widens
(C) holes and electrons recombine
(D) junction becomes hot
viii. Soft iron is used to make the core of transformer because of its $\qquad$ .
(A) low coercivity and low retentivity
(B) low coercivity and high retentivity
(C) high coercivity and high retentivity
(D) high coercivity and low retentivity
ix. If the maximum kinetic energy of emitted electrons in photoelectric effect is 2 eV , the stopping potential will be $\qquad$ .
(A) 0.5 V
(B) 1.0 V
(C) 1.5 V
(D) 2.0 V
x. The radius of eighth orbit of electron in H -atom will be more than that of fourth orbit by a factor of $\overline{(A)} \quad 2$
(B) 4
(C) 8
(D) 16
Q.2. Answer the following questions:
i. What is the value of resistance for an ideal voltmeter?
ii. What is the value of force on a closed circuit in a magnetic field?
iii. What is the average value of alternating current over a complete cycle?
iv. An electron is accelerated through a potential difference of 100 volt. Calculate de-Broglie wavelength in nm .
v. If friction is made zero for a road, can a vehicle move safely on this road?
vi. State the formula giving relation between electric field intensity and potential gradient.
vii. Calculate the velocity of a particle performing S.H.M. after 1 second, if its displacement is given by $\mathrm{x}=5 \sin \left(\frac{\pi \mathrm{t}}{3}\right) \mathrm{m}$.
viii. Write the mathematical formula for Bohr magneton for an electron revolving in $\mathrm{n}^{\text {th }}$ orbit.

## SECTION B

## Attempt any EIGHT questions of the following:

Q.3. Define coefficient of viscosity. State its formula and S.I. units.
Q.4. Obtain an expression for magnetic induction of a toroid of ' N ' turns about an axis passing through its centre and perpendicular to its plane.
Q.5. State and prove principle of conservation of angular momentum.
Q.6. Obtain an expression for equivalent capacitance of two capacitors $\mathrm{C}_{1}$ and $\mathrm{C}_{2}$ connected in series.
Q.7. Explain, why the equivalent inductance of two coils connected in parallel is less than the inductance of either of the coils.
Q.8. How will you convert a moving coil galvanometer into an ammeter?
Q.9. A $100 \Omega$ resistor is connected to a $220 \mathrm{~V}, 50 \mathrm{~Hz}$ supply.

Calculate:
i. r.m.s. value of current and
ii. net power consumed over the full cycle
Q.10. A bar magnet of mass 120 g in the form of a rectangular parallelepiped, has dimensions $l=40 \mathrm{~mm}$, $\mathrm{b}=100 \mathrm{~mm}$ and $\mathrm{h}=80 \mathrm{~mm}$, with its dimension ' h ' vertical, the magnet performs angular oscillations in the plane of the magnetic field with period $\pi$ seconds. If the magnetic moment is $3.4 \mathrm{Am}^{2}$, determine the influencing magnetic field.
Q.11. Distinguish between free vibrations and forced vibrations (Two points).
Q.12. Compare the rate of loss of heat from a metal sphere at $827^{\circ} \mathrm{C}$ with rate of loss of heat from the same at $427^{\circ} \mathrm{C}$, if the temperature of surrounding is $27^{\circ} \mathrm{C}$.
Q.13. An ideal mono-atomic gas is adiabatically compressed so that its final temperature is twice its initial temperature. Calculate the ratio of final pressure to its initial pressure.
Q.14. Disintegration rate of a radio-active sample is $10^{10}$ per hour at 20 hours from the start. It reduces to $5 \times 10^{9}$ per hour after 30 hours. Calculate the decay constant.

## SECTION C

## Attempt any EIGHT questions of the following:

Q.15. Derive laws of reflection of light using Huygens' principle.
Q.16. State postulates of Bohr's atomic model.
Q.17. Define and state unit and dimensions of :
i. Magnetization
ii. Magnetic susceptibility
Q.18. With neat labelled circuit diagram, describe an experiment to study the characteristics of photoelectric effect.
Q.19. Explain the use of potentiometer to determine internal resistance of a cell.
Q.20. Explain the working of n-p-n transistor in common base configuration.
Q.21. State the differential equation of linear S.H.M. Hence, obtain expression for :
i. acceleration
ii. velocity
Q.22. Two tuning forks of frequencies 320 Hz and 340 Hz are sounded together to produce sound wave. The velocity of sound in air is $326.4 \mathrm{~m} / \mathrm{s}$. Calculate the difference in wavelengths of these waves.
Q.23. In a biprism experiment, the fringes are observed in the focal plane of the eye-piece at a distance of 1.2 m from the slit. The distance between the central bright band and the 20th bright band is 0.4 cm . When a convex lens is placed between the biprism and the eye-piece, 90 cm from the eye-piece, the distance between the two virtual magnified images is found to be 0.9 cm . Determine the wavelength of light used.
Q.24. Calculate the current flowing through two long parallel wires carrying equal currents and separated by a distance of 1.35 cm experiencing a force per unit length of $4.76 \times 10^{-2} \mathrm{~N} / \mathrm{m}$.
Q.25. An alternating voltage given by $\mathrm{e}=140 \sin (314.2 \mathrm{t})$ is connected across a pure resistor of $50 \Omega$. Calculate :
i. the frequency of the source
ii. the r.m.s current through the resistor
Q.26. An electric dipole consists of two opposite charges each of magnitude $1 \mu \mathrm{C}$, separated by 2 cm . The dipole is placed in an external electric field of $10^{5} \mathrm{~N} / \mathrm{C}$.
Calculate the :
i. maximum torque experienced by the dipole and
ii. work done by the external field to turn the dipole through $180^{\circ}$.

## SECTION D

## Attempt any THREE questions of the following:

Q.27. On the basis of kinetic theory of gases obtain an expression for pressure exerted by gas molecules enclosed in a container on its walls.

## Q.28.

i. Derive an expression for energy stored in the magnetic field in terms of induced current.
ii. A wire 5 m long is supported horizontally at a height of 15 m along east-west direction. When it is about to hit the ground, calculate the average e.m.f. induced in it. $\left(\mathrm{g}=10 \mathrm{~m} / \mathrm{s}^{2}\right)$
Q.29.
i. Derive an expression for the work done during an isothermal process.
ii. $\quad 104 \mathrm{~J}$ of work is done on certain volume of a gas. If the gas releases 125 kJ of heat, calculate the change in internal energy of the gas.

## Q.30.

i. Obtain the relation between surface energy and surface tension.
ii. Calculate the work done in blowing a soap bubble to a radius of 1 cm . The surface tension of soap solution is $2.5 \times 10^{-2} \mathrm{~N} / \mathrm{m}$.
Q.31. Derive expressions for linear velocity at lowest position, mid-way position and the top-most position for a particle revolving in a vertical circle, if it has to just complete circular motion without string slackening at top.

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