

# Indian National Physics Olympiad (INPhO) – 2025

## Answer Sheet

Roll Number: 

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Date: 2<sup>nd</sup> February 2025

Duration: **Three Hours**

Maximum Marks: 75

### *Please Note:*

- Please write your roll number on top of this page in the space provided.
- This booklet contains 25 number of pages excluding this coverpage.
- Strike out any rough work that you do not want to be considered for evaluation. You may also use the space on the Question Paper for rough work – this will NOT be evaluated.
- Page 2-5 of this booklet is a Summary answersheet and the remaining pages are for writing detailed answers/rough work.
- In the Summary Answersheet write the final answer for each question in the left box and indicate in the right box the page number(s) where the detailed answer is shown.
- Marks will be awarded on the basis of what you write on both the Summary Answer Sheet and the Detailed Answer Sheets in the Answer Booklet. Simple short answers and plots may be directly entered in the Summary Answer Sheet. In some cases required explanations for answered questions should be given in Detailed Answer sheet. Marks may be deducted for the absence of detailed work in questions involving longer calculations.
- Use only black or blue pen (and pencil for diagrams) in this answersheet.
- Adequate space has been provided in the answersheet for you to write/calculate your answers. In case you need extra space to write, you may request additional blank sheets from the invigilator. Remember to write your roll number on the extra sheets and get them attached to your answersheet.
- **This answersheet must be returned to the invigilator.**

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Invigilator Signature:

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*(Do not write anything below this line)*

Q No	1	2	3	4	5	Total
Maximum Marks	8	14	16	22	15	75
Score						

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**HOMI BHABHA CENTRE FOR SCIENCE EDUCATION**

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Q. no.	Summary Answers	Page nos for detailed answer
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1. **The Flywheel Chronicles**

(a)

Expression of  $I$ :

(b)

Value of  $I$ :2. **Gearminator: Rise of the Machines**

(a)

 $\omega_G =$  ;  $X =$ 

(b)

 $\langle P_G \rangle =$  ;  $X =$ 

(c)

 $X =$  ; Value of  $\eta_{\max} =$ 3. **Love is in the air**

(a)

Please use one of the boxes on either of the next two pages.  
Your answer is on page number:

(b)

Indicate the point on the curve where pressure is maximum by marking  $\otimes$ . $P_{\max} =$





## 4. The Magnetic Black Box (MBB)

(a)

Scan	Plot	Orientation (I/II/III/IV)
Horizontal scan	A	
	B	
Vertical scan	C	
	D	

Coordinates of Magnetometer: (  $x_0$  ,  $y_0$  ) = ( , )

(b)(i)

For M1;  $B =$ For M2;  $B =$ 

(b)(ii)

Graph for the magnetic set identification is on page:

 $x$ -axis label: $y$ -axis label:

Slope/Intercept (used in interpretation):

Data corresponds to the set (M1 or M2) :

Justification is on the pages:

Graph for the calculation of  $P'$  is on page: $x$ -axis label: $y$ -axis label:

Slope/Intercept (used in calculations):

Value of  $P' =$

**5. Metalens**

(a)

$$f(r) =$$

(b)

$$\phi(r) =$$

(b)

Lens equation:







































