

TATA INSTITUTE OF FUNDAMENTAL RESEARCH

GS 2024 Physics Entrance Test

Entrance test stages

The Physics entrance test consists of two stages.

1. The first stage of the entrance test is the Screening test (December 2023). The Screening test features multiple-choice type questions.
2. The second stage consists of Interviews/Written tests for the candidates who clear the screening test (Spring 2024).

Syllabus

In general, the syllabus for the Admissions Tests in Physics [Screening test as well as the Interviews/Written tests] is typically a course of studies in Physics as the main subject in the Undergraduate and Masters levels in an Indian University. The questions in the Screening test and the Interviews/Written tests are distributed over the following areas: Classical Mechanics; Mathematics relevant to Physics; Electricity and Magnetism; Quantum Mechanics; Heat, Thermodynamics and Statistical Physics; General Physics; Modern Physics; Electronics and Experimental Physics.

GS 2024 Physics Screening Test Instructions

The instructions for all candidates appearing for the Physics Ph.d. or the Integrated Ph.D. Screening test are given below. Please read these instructions carefully before you attempt the questions.

- You may NOT keep with you any books, papers, mobile phones or any electronic devices which can be used to calculate or get/store information. For a calculator, click the icon on the top right of the question frame on your screen.
- This test consists of TWO sections.
- SECTION A comprises 25 questions, numbered Q.1-Q. 25. These are questions on basic topics.
- SECTION B comprises 15 questions, numbered Q. 1-Q. 15. These may require somewhat more thought/knowledge.
- ALL questions are Multiple-Choice Type. In each case, ONLY ONE option is correct. Answer them by clicking the radio button next to the relevant option.
- If your calculated answer does not match any of the given options exactly, you may mark the closest one if it is reasonably close.
- The grading scheme will be as follows:
Section A: +3 marks if correct; -1 mark if incorrect; 0 marks if not attempted
Section B: +5 marks if correct; 0 marks if incorrect or not attempted, i.e. NO negative marks.
- The invigilators will supply you with paper sheets for rough work.
- Do NOT ask the invigilators for clarifications regarding the questions. They have been instructed not to respond to any such queries. In case a correction/clarification is deemed necessary, it will be announced in the examination hall.
- You can get a list of useful physical constants by clicking on the link Useful Data. Make sure to use only these values in answering the questions, especially where the options are numerical, unless instructed otherwise in the question itself.

Physics Screening Test Sample Questions

SAMPLE QUESTIONS (Please note that there will be negative marking for incorrect answers)

1. The function $f(z) = z^2 + 1$ is integrated over a circle of unit radius in the complex z plane. What is the value of the integral?

[a] 1

[b] i

[c] 0

2. Charged particles are beamed into a region having a uniform electric field of 10^3 Newton/Coulomb and a uniform magnetic field of 10^{-2} Newton/(ampere meter). The electric and magnetic fields are at right angles to each other and the beam of particles is directed perpendicular to both of them, so that the electrical and magnetic forces on an ion oppose each other. The speed of those ions that are unaffected through this region is:

[a] 10^4 m/s

[b] 10^5 m/s

[c] 10^6 m/s

3. The electron in a free Hydrogen atom is initially in the state with quantum numbers $n = 3$ and $l = 2$. It makes an electric dipole transition to a lower energy state. Which of the given states could it finally be in?

[a] $n = 3, l = 0$

[b] $n = 2, l = 2$

[c] $n = 2, l = 1$

4. N particles are distributed amongst three levels having energies 0, kT and $2kT$. If the total equilibrium energy of the system is approximately $425kT$, what is the value of N ?

[a] 1001

[b] 335

[c] 425

[d] 390

[e] 181

GS 2024 Physics Interviews/Written Exams

For the candidates who clear the screening test, selection Interviews/Written Exams will be held in Spring 2024. Further information will be posted on the admissions webpage in due time.