



Vansha Hansda
Engineering Physics
Indian Institute of Technology Bombay

22B1803
B.Tech.
Gender: Female
DOB: 10/12/2003

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2026	6.88
Intermediate	CISCE	Narbheram Hansraj English School Jamshedpur	2022	97.50%
Matriculation	CISCE	Sacred Heart Convent School Jamshedpur	2020	98.00%

SCHOLASTIC ACHIEVEMENTS

- Scored **97.5 percent** in ICSE Board in Class 12, securing **2nd** position in NHES Jamshedpur (2022)
- Scored **98 percent** in ICSE Board in Class 10, securing **2nd** position in SHCS Jamshedpur (2020)
- Secured a rank of **308** in JEE Advanced examination out of a total of 14,000+ ST candidates (2022)

KEY PROJECTS

Coffee Shop Game

(Jul '25 - present)

Self-project in progress | **HTML, CSS, Javascript**

- Building a **multi-stage web game** where players interact with customers, select cup sizes, and make drinks
- Developed **randomized** order generation with recipe structures for multiple beverages and customization options
- Implemented dialogue system with alternating speech bubbles, timed interactions, and **conditional UI** changes
- Designed and created all game assets from scratch, including characters, backgrounds, icons and buttons

Personal Website

(May '25 - Jun '25)

Self-project | **HTML, CSS**

- Designed and developed a **portfolio website** from scratch to showcase creative work, writing and visuals
- Implemented **responsive layout** and smooth scrolling, with images and text overlays, and custom typography
- Deployed a live **website on GitHub Pages** as a digital scrapbook to present professional and personal projects

OTHER PROJECTS

NLP Models vs. ChatGPT | Natural Language Processing

(Sept '24 - Nov '24)

Course Project | Prof. Pushpak Bhattacharyya | Department of Computer Science and Engineering, IIT Bombay

- Compared **SVM-based NER** and **HMM-based POS** models with ChatGPT via detailed confusion matrices
- Identified key misclassifications in capitalized text, temporal entities, and NOUN/ADJ words across datasets
- Assessed both models against benchmark **gold standards** to analyze model strengths, weaknesses, and trends

Numerical Tool for Wave Force Estimation | Offshore Engineering

(Jan '25 - Apr '25)

Course Project | Prof. Manasa Behera | Department of Civil Engineering, IIT Bombay

- Analyzed 84 years of **ERA5** wave data for Bay of Bengal and Arabian Sea on wave height, period, and power
- Analyzed **spatial-temporal trends** and interpreted extreme event anomalies for coastal subregions
- Contributed to interpretation of plots and results for long-term trend assessment and climate impact evaluation

Comparison of Runoff Generation Methods | Hydrogeomorphology

(Mar '25 - Apr '25)

Course Project | Prof. Basudev Biswal | Department of Civil Engineering, IIT Bombay

- Analyzed runoff generation by ϕ -index, SCS-CN, and modified SCS-CN with rainfall and streamflow data
- Optimized hydrological model parameters using **particle swarm optimization** to improve runoff estimates
- Achieved the highest NSE of **0.552** with modified SCS-CN method using **Nash-Sutcliffe Efficiency** metric

Laser Guitar | Digital Electronics and Microprocessors

(Mar '24 - Apr '24)

Course Project | Prof. Maniraj Mahalingam | Department of Physics, IIT Bombay

- Conceptualized, designed, and implemented a **laser-based** musical instrument with interactive virtual strings
- Developed real-time **signal processing** algorithms to detect laser beam interruptions and generate notes
- Integrated multiple sensors with **Arduino** hardware to enhance accuracy and responsiveness of the instrument

Two-Photon Microscopy | Optical Physics

(Jan '25 - Feb '25)

Course Project | Prof. Parinda Vasa | Department of Physics, IIT Bombay

- Studied the two-photon absorption process in detail, including its energy requirements and non-linear behaviour
- Analyzed the role of virtual states and the **Fermi-Golden Rule** in two-photon excitation phenomena
- Described how intensity-dependent absorption mechanisms enable high-resolution deep-tissue imaging

Neutron Scattering for Phonon Dispersion | Condensed Matter Physics

(Sept '25 - Nov '25)

Course Project | Prof. Hridis Pal | Department of Physics, IIT Bombay

- Analyzed phonon dispersion in crystalline solids using neutron scattering techniques to study **lattice vibrations**
- Explored fundamental conservation laws in phonon interactions, linking energy and momentum transfers
- Presented research findings of **phonon dynamics in Iron**, highlighting its anisotropy and thermal properties

Photoinduced Absorption | Molecular Spectroscopy

(Mar '25 - Apr '25)

Course Project | Prof. Dinesh Kabra | Department of Physics, IIT Bombay

- Reviewed literature on photoinduced absorption in **DSSCs**, outlining key insights, limitations and opportunities
- Compared **laser vs. LED PIA** setups for realistic solar simulation and recombination kinetics measurement
- Suggested DSSC improvements via solid-state **electrolytes**, multimodal decay analysis, and advanced PIA

Oxygenation and Anoxic Events | Climate Geology

(Mar '25 - Apr '25)

Course Project | Prof. Bivin G. George | Department of Earth Sciences, IIT Bombay

- Presented Oxygenation and Ocean Anoxic Events, highlighting causes, evidence, and impacts on global climate
- Analyzed geochemical signatures, biological consequences, and climate feedback of oxygenation and anoxic events
- Explored interdisciplinary integration of sedimentology, geochemistry and palaeontology for climate studies

POSITIONS OF RESPONSIBILITY

Editor-in-Chief | Editorial Team

(Apr '25 - present)

Students' Association, Physics Department | IIT Bombay

- Successfully launched and executed the '**Physics Fridays**' series, featuring concise, off-classroom physics reads
- Established and structured the **Editorial Team** based on Statement of Purpose, assignments, and interviews
- Directed the Editorial Team to execute initiatives like **Department Newsletter** and **Freshie Booklet**
- Planned and executed multiple initiatives to actively enhance intra-department activities and foster a positive and collaborative department culture as a member of the Students' Association of the Physics Department

Design Convenor | Saathi

(Jul '24 - present)

IIT Bombay's LGBTQ+ Resource Group

- Successfully organized the design, branding and publicity for Saathi's **institute-wide** annual event, **Rangavali**
- Developed detailed event **branding** and social media graphics, ensuring a unified and recognizable visual identity
- **Designed promotional materials** such as posters to enhance audience engagement and visual storytelling

TECHNICAL SKILLS

Libraries	Pandas, NumPy, Matplotlib, BeautifulSoup, Python Imaging Library
Softwares	MATLAB, Canva, Figma, AutoDesk Fusion 360, Arduino IDE, OriginLab, LTspice, GIS
Programming Languages	HTML, CSS, Javascript, Java, Python, C++, C, L ^A T _E X

KEY COURSES

Computer Science	Speech and Natural Language Processing and the Web, AI and Data Science, Computer Programming and Utilization, Digital Image Processing of Remotely Sensed Data*
Mathematics	Introduction to Numerical Analysis, Complex Analysis and Integral Transforms, Differential Equations, Calculus, Linear Algebra
Physics and Electronics	Analog Electronics, Digital Electronics and Microprocessors, Statistical Physics, Thermal Physics, Fundamental Themes in Physics, Introduction to Quantum Physics, Introduction to Classical Physics, Oscillations and Waves, Classical Mechanics, Electromagnetic Theory, Quantum Mechanics, Introduction to Condensed Matter Physics, Molecular Spectroscopy and Optical Physics, Magnetism and Superconductivity, Non-linear Dynamics*, Astrophysics*, Introduction to Atomic and Molecular Physics*
Miscellaneous	Design Thinking and Innovation, Economics, Physical, Organic and Inorganic Chemistry, Biology, Makerspace, Introduction to Psychology, Introduction to Literature, Environmental Studies, Language Acquisition and Developmental Dyslexia, Hydrogeomorphology, Quantum Chemistry, Offshore Engineering, Biofuels: Technology and Policy Perspective, Climate Geology, Pottery for Beginners*

*To be completed by November 2025

EXTRACURRICULAR ACTIVITIES

Sports

- Represented Hostel 15-A and won the 1st position in Basketball General Championship 2023 and 2024
- Won the 1st position in the intra-college tournament, Institute Basketball Playoffs 2024 and 2025
- Won the 1st position, representing Jamshedpur Zone in CISCE Regional Basketball Tournament
- Led the team and won the 3rd position in JYOTI Inter School Basketball Tournament 2019
- Won the 1st position in JOGGA Inter School Basketball Tournament 2019

Cultural

- Won 1st position in singing in inter-school Odyssey Fest organized by LFS, Jamshedpur

Social

- Volunteered for NSS, IIT Bombay in Van Mahotsav hosted in KV IIT Powai Mumbai