Gour Mohan Sachin Mandal Mahavidyalaya

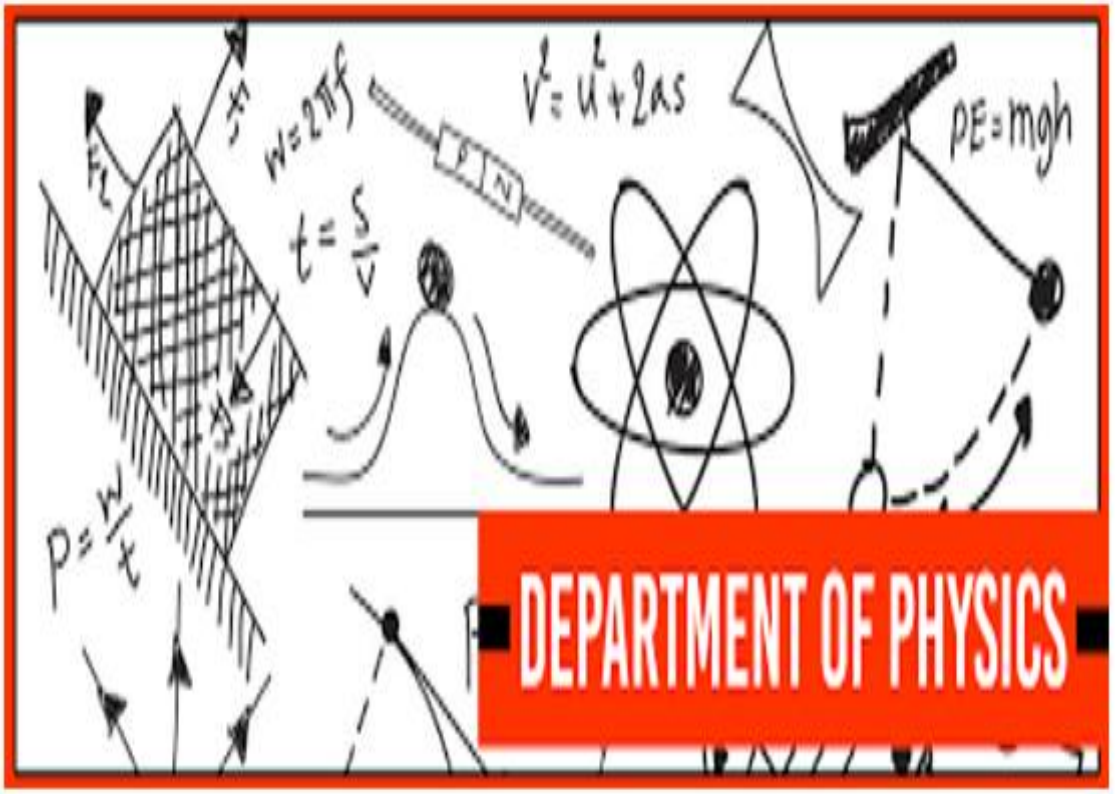
Department of Physics
Evaluative Report

GOUR MOHAN SACHIN MANDAL MAHAVIDYALAYA

BIRESWARPUR, 24 PARAGANAS (S), WEST BENGAL-743336

DEPARTMENT OF PHYSICS

EVALUATIVE REPORT



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INTRODUCTION

Physics—just the name itself carries immense significance. As one of the fundamental pillars of basic science, it serves as the foundation for understanding the physical world. Physics is the science of all natural phenomena, rooted in reasoning, logic, and explanation. With its vast scope, physics branches into multiple specialized fields, each contributing to scientific exploration and research.

The principal branches of physics include:

1. **Mechanics and General Properties of Matter** – Focuses on the physical properties of matter and classical laws of physics.
2. **Acoustics** – Studies the physics of sound.
3. **Electronics** – Deals with semiconductors and integrated circuits (ICs).
4. **Quantum Mechanics** – Explores the quantum behavior of particles and the principles of discreteness.
5. **Nuclear Physics** – Examines the properties of subatomic particles.
6. **Particle Physics** – Investigates interactions between fundamental particles.
7. **Atomic Physics** – Concerns the properties and behavior of atoms.
8. **Astrophysics** – Studies celestial phenomena, including stars and galaxies.

Throughout history, physics has been shaped by brilliant minds such as **Sir Isaac Newton, Albert Einstein, Max Planck, Enrico Fermi, Paul Dirac, Richard P. Feynman, Prof. Satyendra Nath Bose,** and **Prof. Meghnad Saha**. Their groundbreaking contributions have paved the way for numerous advancements in science and technology.

Physics is deeply intertwined with everyday life and has countless applications across industries, power generation, and technological development. It also plays a crucial role in engineering fields, including **Mechanical, Civil, Electrical, Electronics, and Computer Engineering etc**. With its vast scope, physics offers an exhilarating intellectual journey, unlocking new frontiers of knowledge and innovation.

ABOUT THE DEPARTMENT

HISTORY

THE EVOLUTION AND GROWTH OF THE DEPARTMENT OF PHYSICS

Established in 1968, Gour Mohan Sachin Mandal Mahavidyalaya has long been recognized for its excellence in the arts disciplines. However, with a vision for academic expansion, the institution aspired to introduce a science stream—a goal that was finally realized in 2000. Among the newly introduced subjects, Physics marked its beginning on October 23, 2000.

At its inception, the department of physics operated with a single part-time faculty member, who worked diligently to lay the foundation for its academic success. Despite initial challenges, steady progress was made, attracting an increasing number of students to the subject. Over time, the department flourished, as higher secondary science graduates began prioritizing physics for their undergraduate studies.

- Dr. Suman Basu, a Part-time Lecturer in Physics, joined the college in December 2008 and has been serving with dedication, contributing significantly to both teaching and academic activities.
- Mr. Amrit Ghosh, a Guest Lecturer, joined in September 2014 but later left the department in pursuit of a better career opportunity.

At present, the department is driven by the relentless efforts of four State-Aided College Teachers (SACT):

- Dr. Suman Basu
- Mr. Arnab Sarkar
- Mr. Chiranjit Ghorai
- Mr. Suman Pramanik

These faculty members have played a pivotal role in the growth of the department, actively engaging in both teaching and other academic responsibilities of the college. Their dedication has been duly recognized by the college authority and the Government of West Bengal, leading to their promotion as State-Aided College Teachers (SACT).

Additionally, the department received a significant boost with the appointment of its first permanent faculty member, **Dr. Amit Kumar Majhi**, on February 18, 2020. A distinguished scholar, Dr. Majhi earned his Ph.D. from the Indian Institute of Science (IISc), Bangalore, one of the most prestigious research institutes in India and in the rest of world. He further enhanced his expertise by completing a three-year postdoctoral research tenure at the Raman Research Institute, Bangalore, an esteemed institution founded by Nobel Laureate Professor C.V. Raman.

FACULTY PROFILE & ACADEMIC LEADERSHIP

THE PILLARS OF THE PHYSICS DEPARTMENT

With five dedicated faculty members, the Department of Physics at G.M.S.M. Mahavidyalaya stands strong as a beacon of academic excellence. Their collective efforts continue to shape the department, ensuring a thriving learning environment for students and contributing to the institution's scientific and intellectual legacy.

CURRENT TEACHING STAFF:

- Dr. Amit Kumar Majhi (M.Sc., Ph.D, Post Doc)
- Dr. Suman Basu (M.Sc., Ph.D (Tech.))
- Mr. Arnab Sarkar (M.Sc.)
- Mr. Chiranjit Ghorai (M.Sc.)
- Mr. Suman Pramanik (M.Sc.)

Name	Designation	Qualification	Specialization	Date of Joining	Experience (Years)	
					Research	Teaching
Dr. Amit Kumar Majhi	Assistant Professor (Head of Department)	Ph.D.	Soft Condensed Matter Physics	18.02.2020	8	5
Dr. Suman Basu	SACT	Ph.D.	Single Gate SOI MOSFET/DG MOSFET (Symmetric Only)	16.12.2008	5	12
Mr. Arnab Sarkar	SACT	M.Sc.	Computational material Science, Quantum Computation	11.09.2018	1	7
Mr. Chiranjit Ghorai	SACT	M.Sc.	NIL	18.04.2019	NIL	6
Mr. Suman Pramanik	SACT	M.Sc.	Statistical Physics & Soft Condensed matter	18.04.2019	2	7

AVERAGE WORKLOAD:

State-Aided College Teachers (SACT) take 15 classes per week and Permanent teachers take 18 classes a week and working hours are 15 and 40 hours a week respectively.
[Ratio of Permanent Teacher to State Aided College Teacher 1:4]

FACULTY CONTRIBUTIONS IN VARIOUS COMMITTEES

(ACADEMIC YEAR 2018-2025)

The faculty members have actively contributed to various academic and administrative responsibilities throughout the **2019-2025** academic years. Their key roles and contributions include:

❖ **Examination Duties:**

- ➢ Conducting invigilation duties for examinations held by both the **College and University**.
- ➢ Preparing question papers for **internal examinations** and evaluating students' performance.
- ➢ Serving as **internal examiners** for university practical examinations.
- ➢ Undertaking **external examination duties** for university practical examinations.
- ➢ Evaluating answer scripts for both **College and University examinations**.
- ➢ Entering student marks online through the **University of Calcutta's portal**.

2. Student Mentorship & Academic Guidance:

- ➢ Providing **mentorship** and academic support to students.
- ➢ Assisting students with research and career development.

3. **Academic Research & Scholarly Activities:**

- ➢ Organizing **national and international seminars/webinars**.
- ➢ Presenting research papers at **national and international conferences**.
- ➢ Conducting research in their **respective fields**.
- ➢ Reviewing academic papers for **national and international journals**.
- ➢ Writing and publishing research articles in **local, national, and international journals**.

4. Institutional Involvement:

- ➢ Serving as **members of various academic and non-academic sub-committees** at both the **College and University levels**.

Through teachers' active engagement in these diverse roles, the faculty has significantly contributed to the academic excellence, research and institutional development of the college.

Course offered:

The department of Physics runs a 3-year general course and 3 and 4-year honours courses only for bachelor degrees.

Admission procedures:

In all courses, the students are admitted in a "first come first serve" manner until the seats are filled up.

PROGRAM SPECIFIC OUTCOMES

Program Specific Outcomes (PSO) for B.Sc. Physics

- PSO 1. Identifying and describing physical systems with their professional Knowledge.
- PSO 2. Getting knowledge of general physics like sound, wave, friction, forces and laws of motion and use of mathematics.
- PSO 3. Getting knowing about the light and its importance in life, its characteristics, properties and use in various instruments.
- PSO 4. Learning about concepts of nuclear physics and nuclear energies and importance of their use for mankind.

COURSE OUTCOMES

Name of Course	Course Outcomes
PHSA-CC-1-1-TH: Mathematical Physics – I - Theory	CO1: The students will learn basic mathematical tools required to study theoretical and experimental physics.
	CO2: They will also learn how to use these mathematical tools to explain various physical phenomena.
PHSA-CC-1-1-P: Mathematical Physics – I - Practical	CO1: They will also learn basics of programming in open-source programming language Python. CO2: The student will also learn how to use open- source graph plotting software Gnuplot embedded in the open OS Linux.
	CO3: This course enables a student to build the foundation of application of computational techniques in any branch of theoretical and experimental physics as well as in any interdisciplinary branch of research in future.
PHSA-CC-1-2-TH: Mechanics – Theory	CO1: This course is a prerequisite in the study of classical foundation of physics at entry level. The core of this course is Newtonian mechanics and its application in explaining various classical phenomena.
PHSA-CC-1-2-P: Mechanics -Practical	CO1: This course teaches students to perform experiments to verify different laws related to Newtonian mechanics.
	CO2: It also enables them to calculate various physical quantities as described in the theory course.

PHSA-CC-2-3-TH: Electricity and Magnetism - Theory	CO1: The students will be given an idea about electricity (both static and current) and magnetism and various electromagnetic phenomena such as electromagnetic induction, electrical circuits, etc. CO2: Being a fundamental pillar for study in physics and engineering, it explains the students about various application of electricity and magnetism in our daily life. CO3: This course is a prerequisite for advanced topics in electromagnetic theory.
PHSA-CC-2-3-P: Electricity and Magnetism - Practical	CO1: The practical experiments that are being performed in this course will enable a student to get familiar with various electrical components such as power supply, multimeter and various other measuring instruments. CO2: The students will be able to perform various experiments on electricity and magnetism in this course and will learn about precautions to be taken during performing an experiment with electrical equipment.
PHSA-CC-2-4-TH: Waves and Optics - Theory	CO1: The students will be given basic knowledge in vibration, wave motion and wave theory of light. CO2: The study of classical harmonic oscillator and wave motion gives them an insight about the CO3: he phenomena of interference, diffraction and polarization of light and its applications enables a student to progress to more advanced topics of Physics.
PHSA-CC-2-4-P: Waves and Optics - Practical	CO1: The laboratory practical course familiarizes the students with experiments with optical instruments and measurement of various optical parameters.
PHSA-CC-3-5-TH: Mathematical Physics – II - Theory	CO1: Students will learn more advanced topics of mathematical physics like Fourier series and its application. CO2: They'll also learn series solution of the differential equation, some special functions and their application. CO3: Partial differential equations will also be taught in this course along with some improper integrals that are important for studying theoretical aspects in various branches in physics.
PHSA-CC-3-5-P: Mathematical Physics – II - Practical	CO1: In the hands-on practical section, students will learn different packages of Python like numpy, scipy,matplotlib etc. and apply them to find the solutions of problems of matrix algebra, numerical integration, interpolation, solution of differential equation and curve fitting.
PHSA-CC-3-6-TH: Thermal Physics – Theory	CO1: In this course, thermodynamics is introduced to explain the fundamental laws of nature. Students will learn the principle of operation of engines and refrigerators in this course. They will also learn about entropy and thermodynamic potential, an essential concept in explaining chemical reactions. CO2: The students learn the basic energy distribution laws thermal Physics and to explain the basic laws and limitations related to ideal gas.
PHSA-CC-3-6-P: Thermal Physics – Practical	CO1: In this course the student will perform different experiments on heat and thermodynamics that will enhance their experimental skill.

PHSA-CC-3-6-TH: Digital Systems and Applications – Theory	CO1: The students will learn the fundamentals of codes and number system, the binary arithmetic, logics and Boolean functions also to simplify circuits and Boolean expressions using the Boolean laws. Simplify Boolean algebra expressions using Karnaughmaps. CO2: In this course, the students will understand the functions and working of flipflops, counters and registers and their applications into memory circuits. Design different registers and counters. CO3: Design basic combinational and sequential logic circuits.
PHSA-CC-3-6-P: Digital Systems and Applications – Practical	CO1: The students will be able to design and analyze digital logic circuits using different components taught in the theoretical section.
PHS-A-SEC-A-TH: Basics of Programming and Scientific Word Processing – Theory	CO1: This course is a theoretical technical skill enhancement course. In this course, the students will learn the basic elements of programming through programming in C/FORTRAN. CO2: They will also get an introduction to graphical analysis and graphical plotting software Gnuplot. CO3: The students will learn how to prepare a scientific article containing figures, tables and mathematical equations in a presentable form through open-source scientific writing software LaTex.
PHS-A-CC-4-8-TH: Mathematical Physics -III – Theory	CO1: The students will learn some of the mathematical tools such as complex analysis and its application. CO2: They will also learn about integral transform by means of Fourier transform as an extension of Fourier analysis taught in the last semester. CO3: The students will also be acquainted with the concept of special theory of relativity which is extremely essential for understanding the physical world beyond Newtonian mechanics. CO4: The mathematical rigour and the fundamental concepts of probability theory will also be taught in this course.
PHS-A-CC-4-8-P: Mathematical Physics -III – Practical	CO1: The students will learn advanced level Python programming to evaluate numerical solution of differential equation and partial differential equations.
PHS-A-CC-4-9-TH: Elements of Modern Physics – Theory	CO1: The limitations of classical mechanics and classical electromagnetism will be presented in this course and the students will be introduced to the curious world of quantum physics. CO2: The students will become familiar with the mathematical tools and their physical implications in some model quantum systems – a clear deviation from the classical macro level.

PHS-A-CC-4-9-P: Elements of Modern Physics – Practical	CO1: The studentswill learn basics of nuclear physics - nuclear structure, radio activity, nuclear fission &fusion. CO2: They will also learn fundamental principle of Laser and its applications. CO3: This laboratory classes will familiarize the students to the topics learnt in the theory section through the determination of the value of Planck's constant, study of photoelectric effect, verification of Stefan's law of radiation, determination of e/m of electron and behaviour of tunnel diode.
PHS-A-CC-4-10-TH: Analog Systems and Applications – Theory PHS-A-CC-4-10-P: Analog Systems and Applications – Practical	CO1: The basics of analog electronics is taught in this course which is the heart of the modern- day electronic devices. They will understand the fundamentals of semiconductor physics and its application. CO2: Students will learn about the operation, characteristics and various applications of different analog devices and working of amplifier and oscillator. CO1: This laboratory sessions will help the students to get familiarize with the electronic devices and to design and perform experiments with electronic components.
PHS-A-SEC-B-TH: Renewable Energy and Energy Harvesting – Theory	CO1: Students will be able to understand the concept of fossil fuels and alternate Sources of energy. CO2: They will learn in detail about various renewable energy sources – solar energy, wind energy harvesting, ocean energy, geothermal energy, hydro energy, piezoelectric Energy harvesting and electromagnetic energy harvesting.
PHS-A-CC-5-11-TH: Quantum Mechanics and Applications – Theory PHS-A-CC-5-11-P: Quantum Mechanics and Applications – Practical	CO1: The students will learn thoroughly Schrodinger equation and its application in the case of simple harmonic oscillator and hydrogen like atoms in this advanced Quantum Mechanics course. CO2: They will also understand the concept of generalized angular momenta and spin and its its application in the case of hydrogen spectra and fine structure splitting. CO3: The interaction of atoms in magnetic and electric field is also being taught in this course. CO1: The numerical solution of some of the Schrodinger equations in Python will be taught in this course.

PHS-A-CC-5-12-TH: Solid State Physics –Theory PHS-A-CC-5-12-P: Solid State Physics – Practical	CO1: This course explains the physical properties of the material in solid states as an application of quantum mechanics. CO2: The basis of semiconductors and superconductors can be also explained with this theory. CO1: This laboratory sessions will give enough exposure to the students to design and perform experiments with solid state materials.
PHS-A-DSE-A1-TH: Laser and Fiber Optics –Theory	CO1: Students will be able to learn the basic and the generation of different types of LASER and their application. CO2: The mathematical framework of working of Fiber Optics
PHS-A-DSE-B1-TH: Nuclear and Particle Physics – Theory	CO1: This topic in Nuclear Physics introduces the student to the concept of nuclear reaction, interaction of nuclear radiation with matter and detectors for nuclear radiation. CO2: Students will also learn about the particle accelerators and also about fundamental particles and their properties in this course.
PHS-A-CC-6-13-TH: Electromagnetic Theory PHS-A-CC-6-13-TH: Electromagnetic Theory –Practical	CO1: This course teaches the students about the origin and different properties of the EM waves. CO2: Propagation of EM waves in unbounded and bounded media are also being taught in this course. CO3: Electromagnetic origin of wave optics and polarization is also being discussed in this course. CO1: The verification of different physical laws related to the EM wave propagation is done through the laboratory sessions.
PHS-A-CC-6-14-TH: Statistical Mechanics –Theory	CO1: In this course, the students will be able to understand the behaviour and dynamics of a system comprising of a large number of particles. CO2: The Classical Statistical Mechanics teaches them about the classical nature of the system through classical theory of radiation. CO3: Quantum Statistical Mechanics deals with those collections of particles where obeying the laws of quantum mechanics is a necessity and approximation by classical mechanics is no longer valid.
PHS-A-CC-6-14-P: Statistical Mechanics-Practical	CO1: Python programming is used to analyze the behaviour of a collection of particles through numerically calculate partition function and other physical properties.
PHS-A-DSE-A2-TH: Nano Materials and Applications – Theory PHS-A-DSE-B2-TH: Advanced Statistical Mechanics – Theory	CO1: The exciting world of nanotechnology is being discussed here through the basic physics underlying the concept of nano particles. The synthesis and the properties of the nano materials are also being discussed in this course. CO1: This advanced course in Statistical Mechanics introduces the student to the concept of Ising model and non-equilibrium statistical mechanics.

CBCS PHYSICS GENERAL COURSE	
Name of Course	**Course Outcomes**
PHS-G-CC-1-1-TH: Mechanics – Theory	CO1: This course is a prerequisite in the study of classical foundation of physics at entry level. The core of this course is Newtonian mechanics and its application in explaining various classical phenomena. CO2: Students will also learn about some general properties of matter – elasticity, surface tension and viscosity.
PHS-G-CC-1-1-P: Mechanics -Practical	CO1: This course teaches students to perform experiments to calculate different quantities related to Newtonian mechanics.
PHS-G-CC-2-2-TH: Electricity and Magnetism - Theory	CO1: The students will be given an idea about electricity (both static and current) and magnetism and various electromagnetic phenomena such as electromagnetic induction, electrical circuits, etc.
PHS-G-CC-2-2-P: Electricity and Magnetism – Practical	CO1: The practical experiments in this course are modelled in such a way that the students get familiar with various experiments on electricity and magnetism.
PHS-G-CC-3-3-TH: Thermal Physics and Statistical Mechanics –Theory	CO1: In this course, students will learn thermodynamics to explain the fundamental laws of nature. CO2: The students will also learn about the kinetic theory of gases and elementary theory of statistica mechanics.
PHS-G-CC-3-3-P: Thermal Physics and Statistical Mechanics –Practical	CO1: Student will learn to perform various experiments on heat and thermodynamics in this course.
PHS-G-CC-4-4-TH: Waves and Optics – Theory	CO1: The students will be given basic knowledge in vibration and wave motion. CO2: The concept of wave theory of light will be discussed through interference, diffraction and polarization of light and their applications.
PHS-G-CC-4-4-P: Waves and Optics - Practical	CO1: The laboratory practical course deals with the experiments on optics and sound.
PHS-G-SEC-B-TH: Renewable Energy and Energy Harvesting – Theory	CO1: Students will be able to understand the concept of fossil fuels and alternate Sources of energy. CO2: They will learn in detail about various renewable energy sources – solar energy, wind energy harvesting, ocean energy, geothermal energy, hydro energy, piezoelectric Energy harvesting and electro-magnetic energy harvesting.
PHS-G-DSE-A-TH: Analog Electronics – Theory	CO1: Students will learn the basics in analog electronics and will also understand the operation, characteristics and various applications of different analog devices and working of amplifier and oscillator.
PHS-G-DSE-A-P: Analog Electronics – Practical	CO1: In the laboratory course, students will perform experiments with various electronic components like transistors, OPAMPs, etc.

PHS-G-SEC-A-TH: Basics of Programming and Scientific Word Processing – Theory	CO1: This course is a theoretical technical skill enhancement course. In this course, the students will learn the basic elements of programming through programming in C/FORTRAN. CO2: They will also get an introduction to graphical analysis and graphical plotting software Gnuplot. CO3: The students will learn how to prepare a scientific article containing figures, tables and mathematical equations in a presentable form through open-source scientific writing software LaTex.
PHS-G-DSE-B-TH: Digital Electronics – Theory	CO1: The students will learn the fundamentals of digital electronics starting from number system and elementary digital circuits, the functions and working of flipflops, counters and registers and their applications into memory circuits.
PHS-G-DSE-B-P: Digital Electronics – Practical	CO1: The students will be able to design and analyze digital logic circuits using different components taught in the theoretical section.

COURSE OUTCOMES OF 4 YEARS B.A. MAJOR COURSE IN PHYSICS (CCF - NEP – 2020)

SEMESTER -1

Basic Physics I (Minor I is offered to students of other programmes)

After completion of this course (Theory and Practical) students will-

A. MATHEMATICAL PHYSICS

• Get acquainted with the basic mathematical concepts required to understand Physics.
• Learn to solve differential equations often appeared in Physics.
• Learn vector algebra and the coordinate systems.

B. CLASSICAL MECHANICS

• Get acquainted with classical Newtonian mechanics and are able to solve related physical problems.
• Learn dynamics of system of particles; collision problems.
• Learn theories of central force and related problems.
• Learn theories of fluid dynamics. In Laboratory class the students will
• Able to use basic measuring instruments: Vernier Caliper, Screw Gauge, Travelling Microscope etc.
• Able to measure height using sextant
• Able to measure moment of inertia
• Able to measure elastic modulus
• Able to measure coefficient of viscosity of liquid

SEC I -INTRODUCTION TO COMPUTER PROGRAMMING AND GRAPH PLOTTING

This is a laboratory course where students will learn to use computer and software to solve Physics problems and their graphical presentation.
• Learn graph plotting using GNUPLOT.
• Learn Python programming to solve basics mathematical problems.

IDC (Interdisciplinary)

Frontiers in Physics (This course is offered to students of other programmes)

After completion of this course students will
• Get basic idea of scientific and logical methods and are able to differentiate science from pseudoscience.
• Get idea about the Universe: Its origin and evolution
• Learn Energy and Matter and interactions.
• Learn basics of kinetic theory and thermodynamics.
• Learn the historical development of laws of physics from classical to quantum.

SEMESTER II

DSC 2/MINOR 2 -BASIC PHYSICS II
(MINOR 2 IS OFFERED TO STUDENTS OF OTHER PROGRAMMES)

After completion of this course (Theory and Practical) students will

A. BASIC ELECTRICITY AND MAGNETISM

• Able to comprehend Electrostatics and can solve electric field and potential problems
• Able to comprehend Magnetostatics and can solve related field and potential problems
• Get basic idea of magnetism

B. INTRODUCTION TO THERMODYNAMICS

• Build the concepts of kinetic theory of gasses
• Get acquainted with thermodynamic parameters; able to understand thermodynamic laws and heat flow
• Able to solve thermodynamic and heat flow problems
• Build the basic concept of entropy In Laboratory class the students will
• Get acquainted with electrical measuring devices: Ammeter, voltmeter, their connections and applications in electrical circuit and the method of inter conversion
• Learn to use meter bridge, Carey Foster bridge, potentiometer and the method to measure small resistance
• Learn the method to measure thermal expansion coefficient of solid

SEC II - SCIENTIFIC WRITING SKILLS (LATEX)

This is a laboratory course where students will develop scientific writing skills using Latex.
• Learn the fundamentals and rules of Latex and the syntax and its use in writing scientific articles.
• Learn Python programming to solve basics mathematical problems.

IDC - FRONTIERS IN PHYSICS

(This course is offered to students of other programmes) After completion of this course students will
• Get basic idea of scientific and logical methods and are able to differentiate science from pseudoscience.
• Get idea about the Universe: Its origin and evolution
• Learn Energy and Matter and interactions.
• Learn basics of kinetic theory and thermodynamics.
• Learn the historical development of laws of physics from classical to quantum.

SEMESTER III

DSC 3 WAVES AND OPTICS

After completion of this course (Theory and Practical) students will
• Learn theory of oscillations: Simple harmonic, damped and forced vibration and the idea of superposition of harmonic oscillations
• Get the idea of waves: Different kinds of waves and their nature
• Build the concept of superposition of waves, formation of standing waves and the application in plucked and struck string
• Get basic idea of geometrical optics
• Learn the theory of wave optics: Interference, Diffraction and Polarization In Laboratory class the students will
• Learn to use spectrometer and its applications in measuring wavelength of light by different techniques

• Learn to measure wave length of light by interference technique using Fresnel's bi-prism and Newton's ring.
• Learn to measure wave length of light by diffraction technique using spectrometer and grating
• Learn to use polarimeter to measure specific rotation of optically active material

DSC 4: MATHEMATICAL PHYSICS

After completion of this course (Theory and Practical) students will
• Learn power series and its application to solve problems in different branches of Physics
• Learn Fourier series analysis and Fourier Transform
• Get acquainted with partial differential equations and its applications
• Learn the concept of probability and its applications in Physics
• Learn Dirac delta function and some special functions used in Physics
• Learn the techniques of numerical analysis In Laboratory class the students will
• Learn to use numpy and its applications to solve matrix operation, numerical solutions like Lagrange's interpolation, trapezoid and Simpson's 1/3 rule
• Lear to solve ordinary differential equations using Runge-Kutta method
• Learn to use pyplot to draw graphs 9.

SEC - INTRODUCTION TO DATA ANALYSIS

After completion of this course (Theory and Practical) students will
• Learn the method of data analytics: Sampling, Scaling, Grouping and the method of statistical analysis
• Learn Pandas and its applications in data analysis
• Learn to use numpy and its applications in numerical computing
• Learn matplotlib and seaborn for graph plotting and visualization of data

SEMESTER IV

DSC 5: MODERN PHYSICS

After completion of this course (Theory and Practical) students will
• Learn basic theory of Black body radiation and its nature
• Learn basics of quantum mechanics and uncertainty principle
• Learn Schrodinger equation and its application in potential box problem, quantum tunneling,
• Learn quantum theory of Simple harmonic oscillator In Laboratory class the students will
• Learn to measure Planck's constant using LED
• Learn to determine e/m using bar magnet
• Study photoelectric effect
• Study I-V characteristics of tunnel
• Study laser diffraction using grating

DSC 6 – ELECTROMAGNETISM

After completion of this course (Theory and Practical) students will
• Learn the theory of alternating current, its measurement and applications
• Learn the theory of electrostatics and the problem-solving methodologies: potential and field problems, method of images, boundary value problems
• Learn the theory of magnetostatics and the problem-solving methodologies
• Learn dielectric properties and magnetic properties of matter
• Learn the theory of electromagnetism
• Learn Maxwell's equations and its applications in electromagnetic wave propagation in unbounded and bounded

media. In Laboratory class the students will

• Study electrical resonance in LCR circuit

• Study mutual inductance

• Study earth's magnetic field using magnetometer

• Study Malus's law using pair of polaroids

• Study to verify Fresnel's equation using prism and polaroids

DSC 7: MATHEMATICAL PHYSICS II

After completion of this course (Theory and Practical) students will

• Learn to solve second order differential equations and power series solution

• Study linear vector space and related problems

• Learn vector and tensor analysis

• Learn matrix algebra and its applications in Physics problems

• Learn methods of numerical analysis to solve partial differential equations In Laboratory class the students will

• Learn scipy for solving first and second order differential equations

• Learn to solve improper integrals, Gaussian integrals by numerical methods using scipy

• Learn to determine Fourier coefficients using scipy

• Learn to solve partial differential equations, wave equations, heat flow equations, Laplace equations using scipy

DSC 8 – CLASSICAL MECHANICS AND SPECIAL THEORY OF RELATIVITY

After completion of this course (Theory and Practical) students will

• Study non-inertial system and rotational system, rigid body problem

• Learn variational calculus to study mechanics and fluctuation

• Learn Special theory of relativity and concept of space-time In Laboratory class the students will

• Determine moment of inertia of a fly wheel

• Determine Young's modulus by the method of Flexure

• Determine elastic modulus by Searle's method

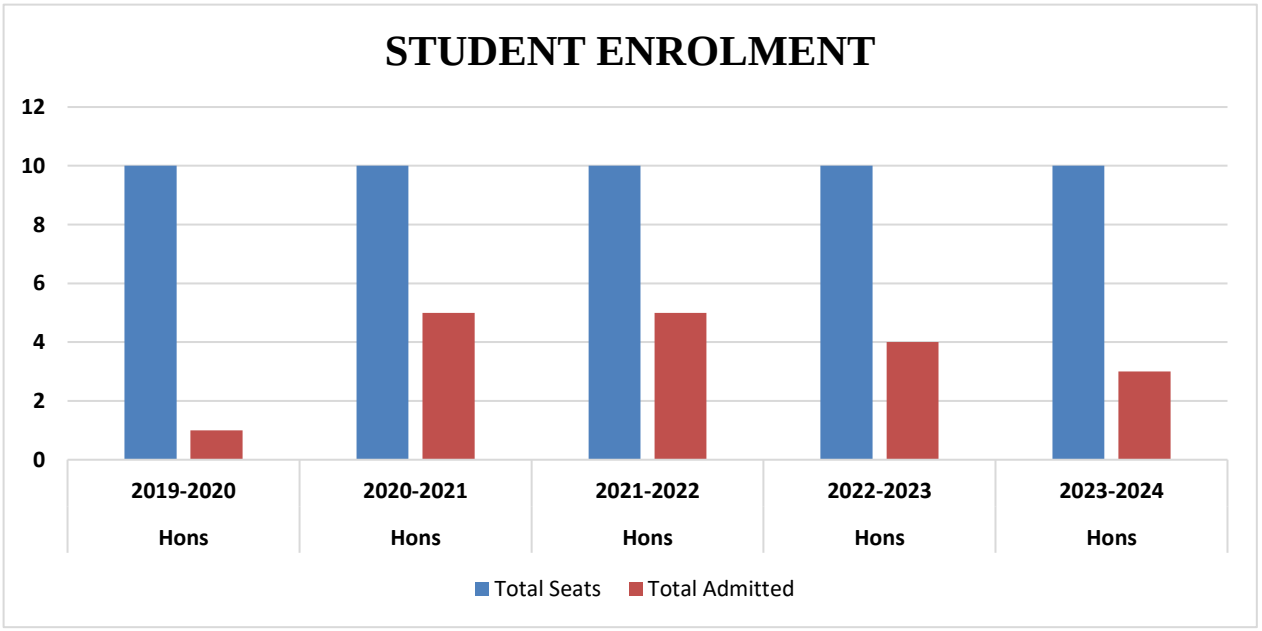
• Determine acceleration due to gravity using bar pendulum

• Study to simple pendulum and its modeling using Tracker's software

STUDENTS' PROFILE

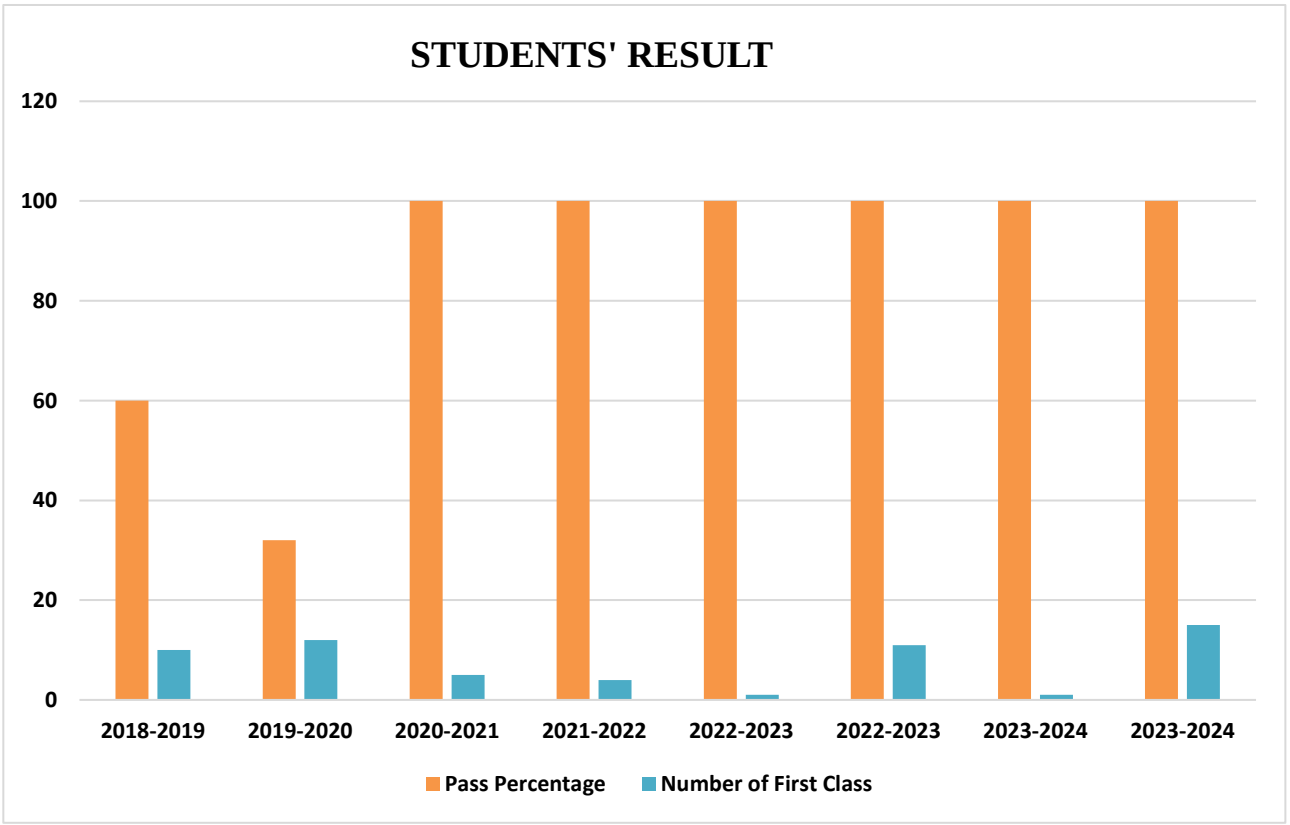
ADMISSION DATA

Name of Course	Session	Total Seats	Total Admitted	Male	Female
General	2018-2019	50	30	22	8
Hons	2019-2020	10	1	0	1
General	2019-2020	50	12	7	5
Hons	2020-2021	10	5	5	0
General	2020-2021	50	9	4	5
Hons	2021-2022	10	5	5	0
General	2021-2022	50	5	2	3
Hons	2022-2023	10	4	4	0
General	2022-2023	50	20	13	7
Hons	2023-2024	10	3	3	0
General	2023-2024	50	20	12	8



STUDENTS' RESULT

Name of Course	Session	Pass Percentage	Number of First Class
General	2018-2019	60	10
General	2019-2020	32	12
General	2020-2021	100	5
General	2021-2022	100	4
Hons	2022-2023	100	1
General	2022-2023	100	11
Hons	2023-2024	100	1
General	2023-2024	100	15



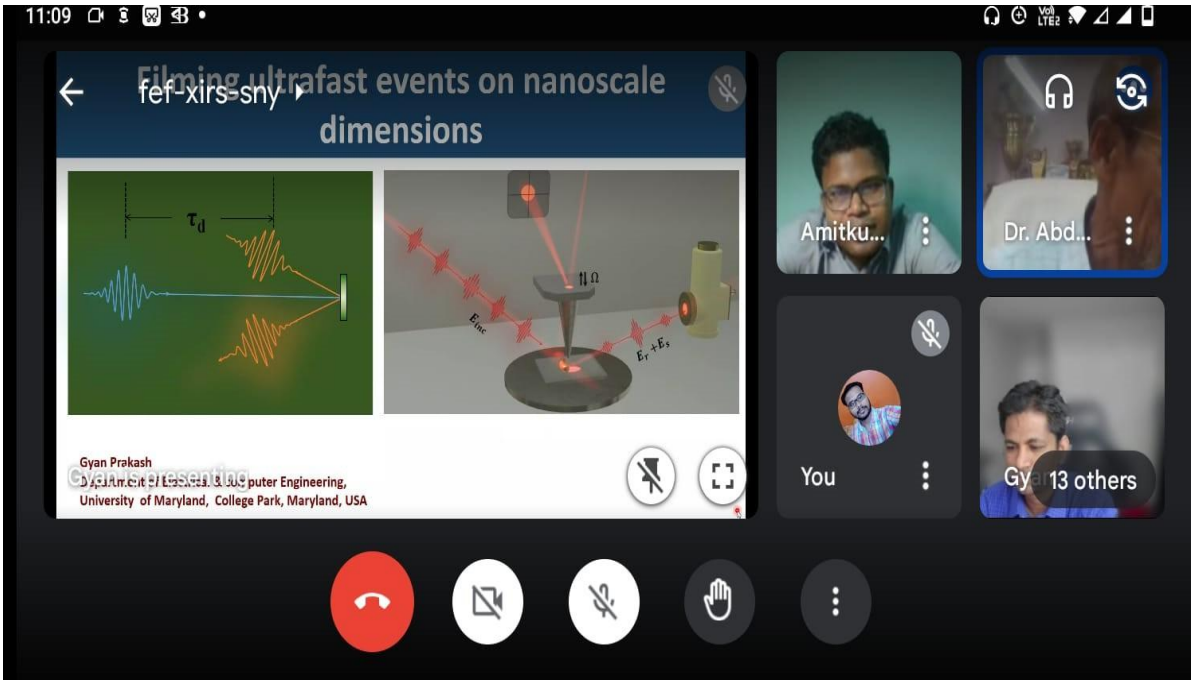
DEPARTMENTAL ACTIVITIES

A. PHYSICS WEBINAR: International Webinars Organised by Department of Physics

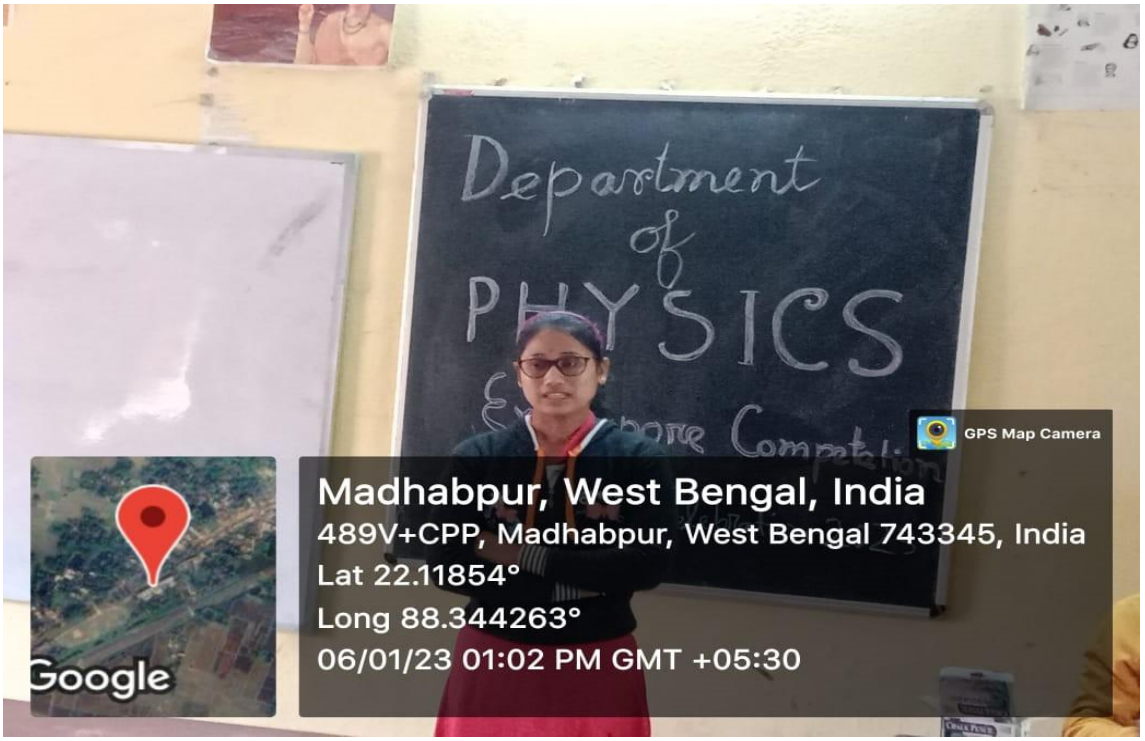
- It was organized on 11.09.2020. Title of the Webinar "Thermoelectric harmony between heat and electricity" Speaker: Dr Ramesh Chandra Mallik, IISc, Bangalore.
- An International Webinar Organised by the Department of Physics, Gour Mohan Sachin Mandal Mahavidyalaya, on 04.02.2023, Title of the Webinar: Gas permeation through graphdiyne-based nanoporous membranes, Resource Person: Dr. Achintya Bera, Department of Physics and Astronomy, School of Natural Sciences, University of Manchester, Manchester M13 9PL, United Kingdom.

B. **PHYSICS WEBINAR:** An International Webinar Organised by the Department of Physics, Gour Mohan Sachin Mandal Mahavidyalaya, on 11.02.2023, Title of the Webinar: What is supervised machine learning? Speaker: Dr. Saientan Bag, Eduard-Zintl Institute of Inorganic and Physical Chemistry, Technical University of Darmstadt, Darmstadt, Germany.

C. **PHYSICS WEBINAR:** An International Webinar Organised by the Department of Physics, Gour Mohan Sachin Mandal Mahavidyalaya, on 12.04.2023, Title of the Webinar: Filming ultrafast events on nanoscale dimensions, Speaker: Dr. Gyan Prakash, Institute for Research in Applied Physics, Department of Electrical and Computer Engineering, University of Maryland, College Park, MD-20740, Mobile: 240-825-6328, Email: gprakashphy@gmail.com, and Email: gyanp@umd.edu



D. **STUDENT SEMINARS AND CELEBRATION OF ENERGY SAVING DAY**: Introduction: The Department of Physics, in collaboration with the college community, celebrated Energy Saving Day. The event aimed to raise awareness about the importance of energy conservation and promote sustainable practices. The celebration saw the active participation of 12 students, 5 teachers from our department, the college principal, and other teachers from various disciplines within the college. Event Highlights: The Energy Saving Day celebration featured a variety of engaging activities and presentations that underscored the significance of energy conservation.



Through teachers' active engagement in these diverse roles, the faculty has significantly contributed to the academic excellence, research and institutional development of the college.

- **Poster Presentation by Students:** A central element of the event was a poster presentation session conducted by the students. Twelve students from the Department of Physics prepared and presented posters that highlighted different aspects of energy conservation. The posters covered topics such as renewable energy sources, energy-efficient technologies, and the environmental impact of energy consumption. The students showcased their creativity and knowledge while emphasizing the need for collective efforts in conserving energy.

- **Interactive Discussions:** Following the poster presentations, interactive discussions were held among the attendees. These discussions provided a platform for students, teachers, and other participants to share their insights, ideas, and experiences related to energy conservation. Participants engaged in thought-provoking conversations about the challenges and solutions associated with sustainable energy practices.

- **Expert Talks:** To enrich the event, two expert teachers from the Department of Physics delivered talks on energy-saving techniques and their implications. The talks covered topics such as energy-efficient lighting, smart home technologies, and the role of physics in understanding energy conservation. These talks not only expanded the attendees' knowledge but also inspired them to adopt energy-saving practices in their daily lives.

- **Principal's Address:** The college principal delivered an address during the celebration, emphasizing the institution's commitment to environmental sustainability. The principal encouraged students and staff to actively participate in energy-saving initiatives and be mindful of their energy consumption patterns. Cross-Departmental Participation: In addition to the Department of Physics, the celebration witnessed the involvement of teachers from various other departments within the college. This cross-disciplinary engagement reinforced the idea that energy conservation is a shared responsibility that transcends academic boundaries.

Conclusion: The Energy Saving Day celebration organized by the Department of Physics was a resounding success. The active participation of students, teachers, and other members of the college community demonstrated a collective commitment to preserving energy resources and mitigating environmental impacts. Through poster presentations, interactive discussions, expert talks, and the principal's address, the event effectively conveyed the importance of energy conservation and provided actionable insights for incorporating energy-saving practices into everyday life.

The event served as a reminder that small actions can collectively create a significant impact. As the Department of Physics continues to champion initiatives that promote sustainability, the Energy Saving Day celebration stands as a testament to the potential of education and awareness in driving positive change.

E. STUDENT WEEK CELEBRATION:

Introduction: The Department of Physics celebrated Students' Day with grandeur and enthusiasm. The event served as a platform for fostering academic excellence, promoting scientific curiosity, and showcasing the vibrant talent within the department. More than 150 students, along with 5 dedicated teachers from our department, the college principal, and teachers from various disciplines across the college, came together to commemorate this special occasion.

Event Highlights: The Students' Day celebration was marked by an array of captivating activities that showcased the diverse aspects of physics and encouraged students to explore the subject beyond the confines of the classroom.

- **Poster Presentation by Students:** The heart of the celebration was the poster presentation session, where a multitude of students displayed their research, projects, and findings. Through these posters, students communicated their innovative ideas, theories, and experiments, reflecting their dedication and passion for physics. The topics covered a wide spectrum of physics-related subjects, ranging from quantum mechanics to astrophysics, and from optics to electromagnetism.
- **Physics Experiment Demonstrations:** The celebration featured a series of captivating physics experiment demonstrations that captured the essence of various theoretical concepts. These hands-on demonstrations not only engaged the audience but also deepened their understanding of complex physical principles. Students showcased experiments in mechanics, thermodynamics, electricity, and more, making the abstract world of physics tangible and exciting.

- **Interactive Sessions:** To encourage interaction and knowledge exchange, the event incorporated interactive sessions between students and faculty members. Attendees had the opportunity to engage in lively discussions, seek guidance, and gain insights into the diverse facets of physics. This interaction not only promoted a collaborative learning environment but also bridged the gap between theoretical knowledge and practical application.
- **Expert Talks and Workshops: T**he Students' Day celebration was enriched by expert talks and workshops conducted by renowned physicists from both academia and industry. These sessions delved into cutting-edge research, emerging trends, and real-world applications of physics. The talks provided students with a broader perspective on the field and inspired them to consider the multitude of possibilities that physics offers.
- **Principal's Address:** The college principal addressed the gathering, commending the students' dedication to the subject and highlighting the importance of fostering a scientific temperament. The principal's words of encouragement motivated students to continue their pursuit of excellence in the field of physics.

Conclusion: The Department of Physics' Students' Day Celebration was an unequivocal success, uniting students, teachers, and enthusiasts in a shared celebration of scientific discovery and exploration. With poster presentations, physics experiment demonstrations, interactive sessions, expert talks, and the principal's address, the event showcased the remarkable talent within the department and underscored the department's commitment to nurturing the next generation of physicists.

The celebration not only provided a platform for students to showcase their achievements but also reinforced the notion that physics is a dynamic and evolving field with myriad possibilities. As the echoes of the celebration resonate, it is evident that the spirit of scientific inquiry and collaboration will continue to thrive within the Department of Physics, inspiring future breakthroughs and discoveries.

F. ADD ON COURSE: The Department of Physics presents an extra course as part of its offerings. Presently, our curriculum focuses exclusively on Python courses annually. This course is open to both college students and individuals external to the institution. While it carries a nominal fee, it is affordably priced.

G. MENTOR-MENTEE: Our department's objective is to cultivate an incredibly warm and conducive learning environment, fostering a strong teacher-student relationship and a culture of mentorship. To achieve this, we actively engage with our students, directly interacting with them. We emphasize the development of problem-solving skills and encourage them to take ownership of their personal growth and leadership journey.

H.Quizzes in Physics: In the hallowed halls of our academic institution, a fervor of excitement is building up as we prepare for the annual Departmental Physics Quiz - an event that promises to be a celebration of knowledge, intellectual prowess, and the spirit of healthy competition.

The heart of this event lies in the collaborative efforts of our esteemed physics faculty, who have meticulously crafted a diverse array of Multiple-Choice Questions (MQCs) encompassing the entire spectrum of physics. From classical mechanics to quantum physics, from electromagnetism to thermodynamics, the questions are designed to challenge and stimulate the inquisitive minds of our students.

This grand undertaking begins with each physics teacher contributing their expertise to curate questions that are not only intellectually stimulating but also reflective of the multifaceted nature of the subject. The amalgamation of these questions ensures that students are tested on their proficiency across various topics, encouraging a holistic understanding of physics.

What makes this quiz unique is its commitment to inclusivity. Every individual student is invited to participate, making it a platform for every physics enthusiast to showcase their knowledge and problem-solving skills. It is a level playing field where each participant has an equal opportunity to shine.

As the students engage in the quiz, the atmosphere is charged with intellectual fervor. The questions serve as a bridge between theoretical knowledge and its practical application, challenging participants to think critically and solve problems on the spot. It's not just a competition; it's an exploration of the wonders of physics.

At the heart of the event lies the anticipation of victory. The top performers, those who navigate the intricacies of the questions with finesse, will be crowned as the champions of the physics department. Their triumph will be celebrated not only as a personal achievement but also as a testament to the collective academic excellence of our institution.

The climax of this intellectual saga is the announcement of winners. The air is thick with anticipation as the names of those who have conquered the physics quiz are revealed. This moment is not just about accolades; it's about recognizing and celebrating a passion for physics and the dedication that each participant has invested in their academic journey.

In conclusion, the Departmental Physics Quiz transcends the boundaries of a conventional academic competition. It is a voyage into the realms of scientific inquiry, a celebration of learning, and a testament to the vibrant academic community that thrives within our institution. As we eagerly await the unfolding of this intellectual spectacle, we are reminded that in the pursuit of knowledge, every question holds the potential for a profound discovery.

DEPARTMENTAL LIBRARY

There are some reference books to enrich the students as well as the teachers. The list of books are as follows:

1. A Treatise on General Properties of Matter: Sengupta & Chatterjee
2. Electricity & Magnetism: Chattopadhyay & Rakshit
3. Thermal Physics: Gupta & Roy
4. Optics: Ghatak
5. Theoretical Mechanics: Spiegel
6. Vector Analysis: Spiegel
7. Lectures on Physics (Vol – I): Feynman
8. Lectures on Physics (Vol – II): Feynman
9. Lectures on Physics (Vol – III): Feynman
10. Mathematics for Physicist: Dennry & Krzywicki
11. Advanced Quantum Mechanics: Sakurai
12. Introductory Quantum Mechanics: Ghoshal
13. Introduction to Solid State Physics: Kittel
14. Solid State Physics: Dekker
15. Statistical Mechanics: Pathria
16. Nuclear Physics: Ghoshal
17. Thermodynamics: Fermi
18. Advanced Acoustics: D. P. Roy Choudhuri
19. Classical Mechanics: S. N. Biswas
20. Digital Principles and Applications: Leach, Malvino, Dutta
21. Electronics: Chattopadhyay & Rakshit
22. Integrated Electronics: Millman and Halkias
23. Snatak Padarthabigyan (Vol – I): C. R. D. G.
24. Snatak Padarthabigyan (Vol – II): C. R. D. G.
25. Snatak Padarthabidya (Vol – I): Mahadev Das Khan
26. Snatak Padarthabidya (Vol – II): Mahadev Das Khan
27. Snatak Padarthabidya (4th Paper): Mahadev Das Khan
28. Parikshamulak Padartha Bigyan: Basudev Ghosh
29. Thermodynamics and Statistical Mechanics: P.V. Panat
30. Introduction to Statistical Mechanics: S. K. Sinha
31. Physics Dictionary
32. Modern Atomic and Nuclear Physics: A. B. Gupta
33. Digital Circuits Vol. I: D. Roy Chowdhury
34. Mathematical Physics: B.D. Gupta
35. Mathematical Physics: B.S. Rajput

36. Introduction to Classical Mechanics: R.G. Takwale & P.S. Puranik
37. Outlines of Physics: Vol.I Dr. Pranab Kumar Karmakar
38. Outlines of Physics: Vol.II Dr. Pranab Kumar Karmakar
39. Electronic Principles: Malvino
40. Electronic Devices & Circuits: Jacob Milman & Christos C. Halkias
41. Basic Electronics: K. K. Ghosh
42. Microprocessor: B. Ram
43. Thermodynamics and Statistical Mechanics: P.V. Panat
44. Classical Mechanics: S.K. Sinha
45. Solid State Physics: M.A. Wahab
46. Quantum Mechanics: Vimal Kumar Jain
47. The Physics of Waves and Oscillations: N.K. Bajaj
48. Mechanics: Hans & Puri
49. Thermal Physics: Garg, Bansal, Ghosh
50. Digital Logic and Computer: M. Morris Mano

SWOC ANALYSIS OF THE DEPARTMENT

STRENGTHS:

- 100% support and cooperation from the department, college and management.
- Job oriented course
- The teacher tries to solve various problems of the students
- Students are physically strong and intellectual
- High attendance of students
- Maximum utilization of minimum resources
- Good relation between teachers and students

WEAKNESSES:

- The college being located in the backward area is not very much aware of the concept of self-development and therefore developmental programmes are not so much desired.
- The economic condition of most students is very weak so students abstain himself/herself from regular classes and work for the sustenance of his/her family.
- Students from weaker sections of the society
- Underdeveloped infrastructural facilities
- Lack of supporting staff

OPPORTUNITIES:

- To develop infrastructural facilities
- Engage events with collaborative agencies

CHALLENGES:

- To increase participation at university level
- To create awareness about job-oriented courses
- To introduce career opportunities
- Financial problems of students

CONCLUSION

The department of physics wants to give thanks to our honorable Teacher in-charge, Dr. Debprasad Mandal and our fellow faculty members and colleagues for their support and whole-hearted cooperation.

Our objective is to lead our students to light the candle of higher education in an area of daily wage-earners. We hence forth look forward to the kind consideration of the government for promoting us to build a better future for the new generation.

It’s a great honor to have the opportunity to offer thanks to the NAAC Peer Team for giving us their valuable time to kindly and patiently go through our departmental activities as provided in the departmental profile.

Thanks to the honourable NAAC Peer Team for their visit to our department. In anticipation and soliciting necessary help for betterment of the department as well as the college.