

MUGBERIA GANGADHAR MAHAVIDYALAYA

P.O.-BHUPATINAGAR, Dist.-PURBA MEDINIPUR, PIN.-721425, WEST BENGAL, INDIA

NAAC Re-Accredited B+ Level Govt. aided College

CPE (Under UGC XII Plan) & NCTE Approved Institutions

DBT Star College Scheme Award Recipient

E-Mail: mugberia_college@rediffmail.com // www.mugberiangadharmahavidyalaya.ac.in/

Programme outcomes and Course outcomes

Department of Physics

Faculties and students of our department are aware of the stated Programme and course outcomes offered by the Institution.

PROGRAMME OUTCOMES: B. Sc. PHYSICS

After successful completion of three year degree (6 SEMETER) program in physics a student should be able to:	
Programme Outcomes	<p>PO1: Attain a deep understanding of the subject matter and enhance the capacity to operate effectively across various interdisciplinary fields.</p> <p>PO2: Explore personal, organizational, and societal values and comprehend the influence of diverse cultural perspectives, as well as the effects of technological progress, innovations, and their applications.</p> <p>PO3: Proficiency in collaborative teamwork, leadership, and effective management techniques to steer the organization towards achieving its Vision and Mission.</p> <p>PO4: Demonstrate proficiency in research methodology, data analysis, and effective communication of research findings in a clear and concise manner.</p> <p>PO5: Acquire a comprehensive understanding of ethical principles and uphold professional ethics through a dedicated commitment.</p> <p>PO6: Enhancement of communication skills, proficiency in teamwork, and the ability to lead effectively</p> <p>PO7: Utilize modern methods, high-quality equipment, and diverse software applications</p>

Programme Specific Outcomes	<p>PSO1: Comprehend and implement the principles of different courses offered under the CBCS curriculum.</p> <p>POS2: Ensure that individuals are properly trained and equipped to safely operate and effectively handle sophisticated instruments.</p> <p>POS3: Comprehend and adhere to established laboratory safety protocols and best practices for maintaining a safe and efficient laboratory environment.</p> <p>POS4: Acquire and improve computer skills.</p> <p>POS5: Drive to pursue advanced education (PG, PhD)</p>
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Course Outcome

Course Code	Course Name	Course Outcome
CC-1	Mathematical Physics-I (Theory)	<ol style="list-style-type: none"> 1. Study of Calculus brings about a clear understanding and estimation of infinitesimal dynamical variations in Space and Time domain. 2. Knowledge of Vector Calculus refers to direction specific variations in 1D, 2D and 3D Space with time dependent coordinate system. 3. Introduction to Probability basically reflects on the Statistical behaviour for very large Data base systems. 4. From this course, students gets enriched in specific Mathematical tools to probe and understand any Physical, Chemical and Biological issues along with Theoretical concepts.
	Mathematical Physics-I (Practical)	<ol style="list-style-type: none"> 1. Understand the basics of programming in Python, which is a universally accepted open source programming language. 2. Know about the open source advanced operating system Linux 3. Operate the Gnuplot for graph plotting which must helps the students to analyze different problems graphically. 4. Apply different computational techniques in any branch of theoretical and experimental physics.

	Electricity and Magnetism (Practical)	<ol style="list-style-type: none"> 1. Electrical circuits - Their types and applications. Development of Network theorem and their uses. This course helps to develop insights for motors, dynamos, etc. and their design along with fabrication of large and small scale electro-magnetic units. 2. Know about various electrical components, power supply, multimeter and various other measuring instruments like (i) Potentiometer (ii) Carey Foster's Bridge (iii) Anderson's bridge (iv) Galvanometer etc 3. Perform experiments on various topics of electricity and magnetism associated with the course 4. Know about precautions to be taken during performing an experiment and will be able to identify different sources of error.
CC-4	<p>Waves and Optics (Theory)</p> <p>Waves and Optics (Practical)</p>	<p>After successful revision of this course, students will acquire knowledge of the following:</p> <ol style="list-style-type: none"> 1. Huygen's wave theory based Interference and Diffraction phenomena (except most of Fresnel's theory) were of topics in squeezed course. 2. Idea about superposition of co-linear and perpendicular liner harmonic oscillators. 3. Details about interference, diffraction and Holography. 4. Knowledge of wave motion and velocity of wave. <ol style="list-style-type: none"> 1. Know about different instruments/parts like (i) Spectrometer (ii) EDF Prism (iii) Sodium source and Sodium Vapour Lamp, Mercury Vapour Lamp (iv) Diffraction Grating (v) wedge-shaped Film etc 2. Understand about different experimental setup like (i) Fresnel Biprism (ii) Newton's Rings (iii) Michelson's interferometer
CC- 5	Mathematical Physics-II (Theory)	<p>After completion of this course, the students are expected to gain knowledge/skill about the following topics :</p> <ol style="list-style-type: none"> 1. To understand Fourier series and Fourier transform and apply to analyze various periodic and non periodic functions.

	Mathematical Physics-III (Practical)	<ol style="list-style-type: none"> 2. Detailed understanding of physical problems with integral transformation. 3. Knowledge about matrix algebra and their application to find out ordinary differential equation. <p>Gain knowledge on the solution differential equation and different kind of function like Gaussian function, Dirac Delta function etc using Python.</p>
CC-9	Elements Of Modern Physics(Theory) Elements Of Modern Physics (Practical)	<p>After completion of this course, the students are expected to gain knowledge/skill about the following topics</p> <ol style="list-style-type: none"> 1. Understand the inadequacies of classical mechanics and appreciate the historical development of quantum mechanics and its applicability. 2. Knowledge of Schrodinger equation and its application. 3. Understand of basic nuclear structure. 4. Knowledge of radio activity, fission fusion etc. <p>Development of ability on experiment mainly focus on Quantum effect of some Physical phenomenon.</p>
CC-10	Analog System and Application (Theory) Analog System and Application(Practical)	<p>After completion of this course, the students are expected to gain knowledge/skill about the following topics</p> <ol style="list-style-type: none"> 1. Understand of basic ideas of Semiconductor and its formation. 2. Basic knowledge on some semiconducting devices. 3. Detailed understanding of transistor action and its application. 4. Understand of Op-Amp application. 5. Knowledge of few kind of oscillator circuit and its application. <p>Enhancement of ability to perform experiments based on electronic devices like transistor, Zener diode, etc.</p>
SEC-2	Basic Instrumentation Skills (Theory)	<p>After completion of this course, the students are expected to gain knowledge/skill about the following topics</p>

	Quantum Mechanics and Applications (Practical)	<ol style="list-style-type: none"> 1. Solve different Quantum Mechanics problem using Python and scilab. 2. Development skill in numerical method.
CC-12	Solid State Physics (Theory)	<ol style="list-style-type: none"> 1. Understand basic crystal structure and compare various crystal systems 2. State and prove Bragg's law and Explain X-ray diffraction and various methods to obtain diffraction pattern 3. Idea about Lattice Vibrations and Phonons. 4. Understand basic properties of semiconductors and band structure of solids 5. Familiarize with magnetic properties of matter and its classification. 6. Idea about Elementary band theory. 7. Introduction to superconductivity and its properties.
	Solid State Physics (Theory)	<ol style="list-style-type: none"> 1. Students gain insight into understanding of physics of magnetic properties of matter, hall effect and measured it experimentally. 2. Run sophisticated instrument
DSE-1	Classical Dynamics	<p>Student will accrue knowledge in the following topic after successfully completing the course :</p> <ol style="list-style-type: none"> 1. Review of Newtonian Mechanics and introduction of Lagrangian and Hamiltonian. 2. Application of Lagrangian and Hamiltonian in different system. 3. Familiarizations and its application of Small System. 4. Ideas on Special Theory of Relativity and will be able to solve the problem using four-momentum. 5. Drive and application of Poiseuille's equation, Navier-Stokes equation, qualitative description of turbulence and Reynolds number.
DSE-2	Nuclear and Particle Physics	<p>After completion of this course students will able to</p> <ol style="list-style-type: none"> 1. Explain the nuclear structure, different nuclear Models . Predict the spin parity of nucleus. 2. Ideation about the radioactive decay process. 3. Analyze the types of nuclear reactions, familiarization with detectors and accelerators. 4. Know different types of elementary particles, associated quantum number and their interaction.

Mapping of COs with POs and PSO
3: High, 2: Medium, 1: Low

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CC-1	3	2	2	2	1	2	3	3	1	1	3	2
CC-2	3	1	2	1	2	3	3	3	3	3	2	2
CC-3	3	2	3	1	2	3	3	3	3	3	2	2
CC-4	3	2	2	2	2	3	3	2	3	3	3	2
CC-5	3	2	3	3	2	3	2	2	2	1	3	2
CC-6	3	2	3	1	3	3	3	3	3	3	2	2
CC-7	3	2	2	2	2	3	3	3	2	3	3	2
CC-8	3	2	3	2	2	2	2	2	2	2	3	3
CC-9	3	2	3	3	3	3	3	2	3	3	3	2
CC-10	3	2	3	3	3	2	3	3	3	2	2	2
CC-11	3	3	3	3	1	3	1	3	1	2	3	3
CC-12	3	3	3	3	1	3	1	3	1	2	3	3
CC-13	3	3	2	3	2	2	3	2	3	3	1	2
CC-14	3	3	2	3	3	2	2	3	3	3	1	2
DSE-1	3	3	3	3	2	3	3	3	3	2	1	3
DSE-2	3	3	3	3	2	3	2	3	3	2	2	3
DSE-3	3	3	2	3	3	3	2	3	3	2	2	2
DSE-4	3	2	3	3	3	2	3	3	3	3	1	1
SEC-1	2	2	3	2	2	2	3	2	3	3	1	1
SEC-2	2	2	3	2	2	2	3	2	3	3	1	1
GE-3	3	1	2	3	3	2	3	3	2	3	2	3
GE-4	3	2	3	3	3	3	2	3	3	2	3	3

Based on the score put on every column and row, we have evaluated the marks of each CO, PO and PSO (Shown in next page). Each score fall under medium to high range

Course	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Average of CO
CC-1	3	2	2	2	1	2	3	3	1	1	3	2	2.083
CC-2	3	1	2	1	2	3	3	3	3	3	1	2	2.25
CC-3	3	2	3	1	2	3	3	3	3	3	2	2	2.5
CC-4	3	2	2	2	2	3	3	2	3	3	3	2	2.5
CC-5	3	2	3	3	2	3	2	2	2	1	3	2	2.333
CC-6	3	2	3	1	3	3	3	3	3	3	2	2	2.583
CC-7	3	2	2	2	2	3	3	3	2	3	3	2	2.5
CC-8	3	2	3	2	2	2	2	2	2	2	3	3	2.333
CC-9	3	2	3	3	3	3	3	2	3	3	3	2	2.75
CC-10	3	2	3	3	3	2	3	3	3	2	2	2	2.583
CC-11	3	3	3	3	1	3	1	3	1	2	3	3	2.416
CC-12	3	3	3	3	1	3	1	3	1	2	3	3	2.416
CC-13	3	3	2	3	2	2	3	2	3	3	1	2	2.416
CC-14	3	3	2	3	3	2	2	3	3	3	3	2	2.666
DSE-1	3	3	3	3	2	3	3	3	3	2	1	3	2.666
DSE-2	3	3	3	3	2	3	2	3	3	2	2	3	2.666
DSE-3	3	3	2	3	3	3	2	3	3	2	2	2	2.583
DSE-4	3	2	3	3	3	2	3	3	3	3	1	1	2.5
SEC-1	2	2	3	2	2	2	3	2	3	3	1	1	2.166
SEC-2	2	2	3	2	2	2	3	2	3	3	1	1	2.166
GE-3	3	1	2	3	3	2	3	3	2	3	1	2	2.333
GE-4	3	2	3	3	3	3	2	3	3	2	1	2	2.5
Average of PO and PSO	2.9	2.227	2.63	2.45	2.22	2.59	2.54	2.68	2.54	2.45	2.04	2.09	

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Department of Physics

Attainment of Course & Programme Outcomes

Assessment in Outcome Based Education (OBE) involves one or more processes implemented by the department to gather data and evaluate students' attainment of COs and POs. These assessment methods are classified into two types: direct methods and indirect methods.

1. Direct Methods: Direct methods focus on assessing students' knowledge and skills through their performance in various activities. These methods provide tangible evidence of student learning. Some commonly used direct assessment methods include:
 - Internal Assessment Tests
 - Assignments
 - Surprise test
 - Seminars/Presentation
 - Laboratory Assignments/Practical.
 - Mini Projects
 - Class Attendance
 - Semester Examinations

Direct assessment methods provide concrete evidence of students' knowledge, skills, and application abilities, offering a comprehensive understanding of their learning outcomes.

2. Indirect Methods: Indirect methods are used to gather feedback and opinions about students' learning experiences and the effectiveness of the educational process. Although they do not directly measure knowledge and skills, these methods provide valuable insights into students' perceptions and satisfaction. Two commonly used indirect assessment methods are:
 - Course Exit Survey
 - Examiner Feedback

Indirect assessment methods help capture students' opinions, thoughts, and reflections on their learning journey, providing valuable insights for curriculum development and teaching improvement.

Details description can be found following Table:

Direct Assessment tool used for CO attainment			
Sr. No.	Name of Assessment Method	Frequency	Description
1	Internal Assessment Test	2 per semester	Assessments conducted within the semester to gauge students' progress and mastery of course material. Generally, assessments are conducted at the end of the 6 th and 11 th weeks of each semester. It is a metric utilized for continuous assessment of the attainment of course outcomes with respect to course objectives. The Internal Assessment Marks for the relevant course is calculated as the average marks of two tests
2	Assignments	2 per semester	Usually, assignments are given to students before the internal assessment to showcase their understanding, critical thinking, and problem-solving abilities in relation to the course content.
3	Surprise test	2-4 per semester	A surprise MCQ (Multiple-Choice Question) test is conducted to assess the ongoing performance of students in a specific topic related to the course.
4	Seminars/Presentation	Frequently	The department organizes seminars and invites resource persons to enrich students' knowledge in various research areas. Additionally, student seminars are organized where students take on the role of speakers and deliver lectures on relevant topics from their courses. These seminars serve as a means to assess students' communication and presentation skills, as well as their depth of subject knowledge.
5	Laboratory Assignments/Practical	2 per weeks	Practical exercises performed in laboratory settings to assess students' practical skills, experimental techniques, and data analysis abilities.
6	Mini Projects	1 per semester	Small-scale projects assigned to students to apply their learning and showcase their ability to execute tasks.
7	Class Attendance	As per University	Marks awarded as per College guideline.

		Guideline	
8	Semester Examinations	1 per semester	Comprehensive exams conducted at the end of the semester to assess students' overall knowledge and skills acquired throughout the course.
Indirect Assessment tool used for PO/PSO attainment			
Sr. No.	Name of Assessment Method	Frequency	Description
1	Course Exit Survey/Students feedback	1 per semester	A survey administered to students towards the end of the course to gather feedback on the overall learning experience, teaching methods, curriculum, and suggestions for improvement.
2	Examiner Feedback	1 per semester	Feedback collected from external (internal) examiners or experts to evaluate students' performance and provide an external perspective on the attainment of POs.

The attainment of Course Outcomes (COs) and Programme Outcomes (POs) is evaluated based on the aforementioned tools, and therefore, the evolution of marks in a particular course is relevant here. Details can be found below:

Marks Distribution

CC/DSE/GE (Total 75)

Attendance (A): 5

Internal Assessment (I): 10 (Mentioned in Table)

Theory Examination (T): 40 (University Examination, mentioned in Table)

Practical (P): 20

Attendance:

05 if 95% and above

04 if 90-95%

03 if 85-90%

02 if 80-85%

01 if 75-80%

Practical Examination:

Centre: Department

Examiners: One internal examiner to be nominated by the college and one external examiner to be nominated by VU, both the examiners is to be appointed by the Controller of Examinations.

Distribution of marks: Lab Note Book - 2 Viva-voce – 3 Experiment – 15

Attainment of COs based on Direct Method

ATTAINMENT LEVELS FOR COs

Target Level	Total (A+I+T+P) % of marks obtained in reverent Course
1	<40
2	40-49
3	>=50

$$\text{Score} = \frac{\sum \% \text{ marks all student in a particular course}}{\sum \text{no of students}}$$

The entire student of this batch left during 2020 session before completing the course . The attainment is based on the marks obtained in that particular course.

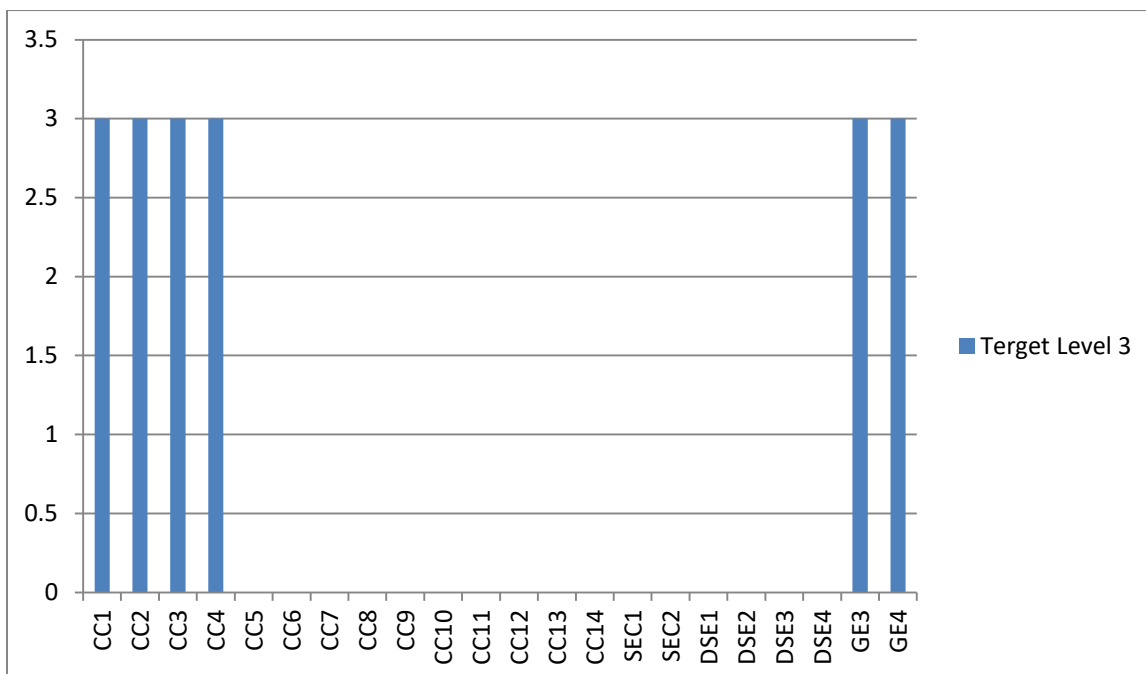


Fig1:Attainment level of UG Physics (Hons) course

Attainment of POs & PSOs

Attainment of POs and PSOs are based on student feedback, examiner feedback and enrolment in higher education/jobs.

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Department of Physics Student Feedback Form

Dear Students,

Congratulations on successfully completing your B.Sc (Hons) in Physics from Mugberia Gangadhar Mahavidyalaya. The department values your feedback on various aspects that can contribute to its improvement. We kindly request you to provide your thoughtful responses to the following questionnaire (put the tick mark in appropriate column).
Thank you for your cooperation.

E: Excellent, G: Good, A: Average, P: Poor

Description	E	G	A	P
General about Department				
1				
Vision, mission and goals of the department				

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Department of Physics Teachers Feedback Form

E: Excellent, G: Good, A: Average, P: Poor

Description	E	G	A	P
General about Department				
1				
The curriculum of your Department has been updated from time to time.				
2				
I am given enough freedom to contribute my ideas on curriculum design and development.				
3				
Faculty Orientations programs for the introduction of the new Syllabus is organised.				
4				
Freedom is given in adopting new techniques/				

Fig2: Sample of Feedback form for Student (left) and Examiner (right)

Scan copy of Feedback Form		
Sl. No.	Description	Link
1	Student feedback form	
2	Examiner feedback form	https://drive.google.com/drive/folders/1jUZ4T0uzDRoRvk6NWIW3uqQcvIYGiSd7?usp=sharing

For attainment level, we have average over all questionnaire related to POs and PSOs received from students and examiner. Here is the rating level:

Excellent: 4

Good: 3

Average: 2

Poor: 1

ATTAINMENT LEVELS FOR POs and PSOs												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
level	3.3	3.2	3.2	3.5	3.4	3.4	3.5	2.3	2.4	2.0	2.6	1.2

This is based on examiner feedback.