Hindi Vidya Prachar Samiti's

Ramniranjan Jhunjhunwala College

of Arts, Science & Commerce

(Autonomous College)

Affiliated to

UNIVERSITY OF MUMBAI

Syllabus Framework As Per LOCF

Program: M.Sc. PHYSICS

Program Code: RJSPGPHY

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THE PREAMBLE

Why Physics

Physics deals with fundamental concepts of phenomena occurring in day to day life and nature. It provides powerful tools to express our creativity, to see the world in new ways and then to change it. It gives an insight into the way the nature operates. Physics helps to understand the world around us, and satisfy our curiosity. Studying physics develops our critical thinking and problem-solving skills. Physicists are versatile, who can be torch bearers and can guide students to excel in wide ranging fields for future careers. It is a global enterprise and offers the opportunity to work in scientific fields all over the world. It also opens opportunities in international research collaborations. Physics drives technology advancements, impacting society, the environment and the economy of the country.

Why Physics in RJ College

Physics department in R J College has highly qualified faculty members and support staff It is committed towards the development of innovative and effective ways of teaching at graduate, post graduate and developing a core research group for carrying out cutting edge research in various research fields like Condensed Matter Physics, Solid State Physics, Electronics, Material Science, Nonlinear Dynamics, Statistical Physics, Astronomy and Simulations. The department also offers Doctoral Programme in order to nurture young minds towards embracing various scientific challenges. Efforts are taken to pay individual attention to the students in their laboratory work and tutorial sessions. Project work and problem sessions are encouraged to develop innovative and analytical approaches to Physics learning. The department provides conducive and friendly environment that nurtures excellence and high standards of professionalism in teaching, learning and research. The department has a progressive approach in professional development of faculty members and it is achieved by sending them for training courses like refresher course, FDP etc. so as to maintain a high degree of efficiency and performance. The faculty has research collaborations with prestigious institutes from the country. To update the students about the various developments in the Physics related fields, many invited lectures, talks and field visits are organized by the department which increases the student's interest in the subject. Post graduate

students carry out their projects under the able guidance of the faculty and Scientists in renowned institutes in and around the city like Institute of Chemical Technology (ICT), Society for Applied Microwave Electronics Engineering and Research (SAMEER), Indian Institute of Technology (IIT), Bombay, Tata Institute of Fundamental Research (TIFR), Bhabha Atomic Research Centre (BARC), Indian Institute of Geomagnetism (IIGM). The Physics department has a group of alumni spread all over the world holding prestigious positions.

Our Curriculum Your Strength

The curriculum designed by the Physics department is a learner-centered covering aspect of Physics in broad scale. In semester I and II the students learn core courses such as Classical Mechanics, Quantum Mechanics I-II, Solid State Physics, Mathematical Methods, Electrodynamics, Atomic and Molecular Physics and Statistical Physics. In Semester III and IV, students have four core courses and four elective courses. The core courses include Nuclear Physics, Computational Physics, Experimental Physics and Solid State Devices. At present, the department offers four elective courses in Material Science, four in Electronics, one in Astronomy and one in Laser Physics. We endeavour to offer newer elective courses. There are two general laboratories and two computer laboratories in Sem I and II. These two computer laboratories along with the core course in computational Physics gives students a solid base in Computational Methods used in Physics. In Sem III and IV students carry out projects along with two Advanced Laboratories. It is a rigorous M Sc course in which students are given training in problem solving skills and exposure to research.

Programme Outcome for M Sc Physics

Programme outcomes refers to the overall characteristics an individual is supposed to acquire on the completion of the two year program in Master of Science. The attributes based on acquisition, accumulation and processing of knowledge of the particular subject are transferable beyond the discipline and useful in different domains of life.

On successful completion of this program students will be trained in:

PO1: Analytical thinking: Develop analytical abilities towards real world problems.

PO2: Problem solving: Enrich knowledge through problem solving hands-on activities, study visits, projects etc.

PO3: Critical thinking: Critically evaluate practices, policies and theories by following scientific approach to knowledge development.

PO4: Communication Skills: Ability to express thoughts and ideas effectively in writing and orally, communicate with others using appropriate media; confidently share one's views and express herself/himself.

PO5: Information/digital literacy: Capability to use ICT in a variety of learning situations,

demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.

PO6: Lifelong learning: Ability to acquire knowledge and skills, including "Learning how

to learn", that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development

PO7: Carrying out Research: Ability to identify research problems, plan and execute research projects.

Program specific outcomes for M Sc Physics

PSO1: Students shall demonstrate proficiency in applying knowledge of Physics in understanding working principles of various physical systems and instruments.

PSO2: Students will demonstrate knowledge of Classical mechanics, Thermodynamics and Statistical Mechanics, Solid State Physics, Atomic and Molecular Physics, Nuclear Physics, Electrodynamics, Computational Physics, Quantum Mechanics and will be able to apply this knowledge to analyze various physical phenomena.

PSO3: Students will demonstrate the problem solving skills in the core and allied subject**s.**

PSO4: Students will show that they have acquired experimential skills, enabling them to take measurements in a physics laboratory and analyze the measurements to draw valid conclusions.

PSO5: Students will be capable of oral and written scientific communication and will prove that they can think critically and work independently on projects.

M Sc Physics Programme Specific Outcomes Descriptors

	SEM I						SEM II						SEM III						SEM IV					
	P1	P2	P3	P4	GL1	CL1	P1	P2	P3	P4	GL2	CL2	P1	P2	P3	P4	PR1	AL1	P1	P2	P3	P4	PR2	AL2
Disciplinary knowledge	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Analytical thinking	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Problem solving skill	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Critical thinking	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Experiential learning					√	√					√	√					√	√					√	√
Digital Literacy						√						√	√											
Communication skill	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

Teaching Learning Methods

The teaching learning method has been designed with student centric focus. The main aim of the teaching pedagogy is to teach domain knowledge to the students. It further aims to develop critical thinking, logical analysis and comprehensive development of the students studying the subject. The teaching learning methods include:

- Classroom teaching: Explaining concepts, theories, methodologies related to the subject
- Blended learning: Use of zoom platform, explainer videos and documentaries
- Knowledge repository: Use of Google classroom and canvas LMS
- Presentations: online and offline based on the syllabus
- Field visits: to the discipline related institutions
- Digital learning: Training students with the digital tools and technologies

Assessment Method

1. 40 marks are allotted to continuous evaluation. Teachers can decide the methods..
2. One External (Semester End Examination) of 60 marks. Duration: 2.5 hours.
3. Minimum marks for passing is 40 %. It is necessary to pass in continuous evaluation and semester end examination separately.
4. For any ATKT examinations, there shall be ODD-ODD/EVEN-EVEN pattern followed.
5. HOD's decision, in consultation with the Principal, shall remain final and abiding to all.

Evaluation and Assessment

Total marks per course - 100.

Continuous Assessment - 40 marks

Semester End Examination – 60 marks Question paper covering all units, no pre

decided pattern, at least 50% option.

Each project will be of 100 marks with 40% by internal and 60% by external evaluation.

The project report should be plagiarism free, submitted on email and should have the following format

- Title Page/Cover page
- Certificate endorsed by Project Supervisor and Head of Department
- Declaration
- Abstract of the project
- Table of Contents
- List of Figures
- List of Tables
- Chapters of Content –

- Introduction and Objectives of the project
- Experimental/Theoretical Methodology/Circuit/Model etc. details
- Results and Discussion if any
- Conclusions
- References

Evaluation by External/Internal examiner will be based on following criteria: (each semester)

Criteria	Maximum Marks
Literature Survey	10/100
Objectives/Plan of the project	10/100
Experimental/Theoretical methodology/Working condition of project or model	20/100
Significance and originality of the study/Society application and Inclusion of recent References	10/100
Depth of knowledge in the subject / Results and Discussions	20/100
Presentation	30/100
Maximum marks by External examiner	60
Maximum marks by internal examiner/guide	40
Total marks	100