

**NEW COURSE STRUCTURE- To be effective from academic
session 2018-19 Based on CBCS & OBE model**

for

M.Sc.(Physics)



**Department of Physics B.I.T. Mesra,
Ranchi 98A, Academic Council, 2nd May,
2018**

CBCS based Course Structure & Syllabus for MSc. (Physics) programme

Important notes:

- The basic criteria of UGC have been followed in preparing the course structure of this programme.

Department Vision

To become an internationally recognized centre of excellence in academics and research in the area of Physics and related inter-disciplinary fields.

Department Mission

The Department of Physics (previously known as Department of Applied Physics) since its inception in 1955 has played a pivotal role in the institute. This course aims to train the young students with the following objectives:

- To impart high quality Science education in a vibrant academic ambience.
- To prepare students to take up challenges as a researcher in diverse areas of theoretical and experimental physics.
- Excellent lab and internet facilities.
- Opportunity of pursuing high end research as project work.
- Students to take admission in the Ph.D. programs of different prestigious research organizations.
- During 3rd and 4th semesters, students may opt special papers for the following areas: Theoretical and Computational Physics, Condensed Matter Physics, Electronics, Photonics and Plasma Sciences.

Program Educational Objectives of M.Sc.(Physics):

1. To impart high quality education in Physical Sciences.
2. To prepare students to take up challenges as globally competitive physicists/researchers in diverse areas of theoretical and experimental physics.
3. To make the students technically and analytically skilled.
4. To provide opportunity of pursuing high end research as project work.
5. To give exposure to a vibrant academic ambience.
6. To create a sense of academic and social ethics among the students.
7. To prepare them to take up higher studies of interdisciplinary nature.

Program Outcomes of M.Sc.(Physics):

1. The students will obtain good knowledge in Physical Sciences. They will be trained to compete national level tests like UGC-CSIR NET, JEST, GATE, etc., successfully.
2. They will be prepared to take up challenges as globally competitive physicists/researchers in diverse areas of theoretical and experimental physics.
3. They will be technically and analytically skilled enough to pursue their further studies.
4. They will have a sense of academic and social ethics.
5. They will be capable of taking up higher studies of interdisciplinary nature.
6. They will be able to recognize the need for continuous learning and develop throughout for the professional career.

Course Structure for M.Sc.(Physics)

Level		Code no.	Name of the subjects	L	T	P	C	
4	I- Semester	THEORY						
		PC	PH 401	Mathematical Method in Physics	3	0	0	3
			PH 402	Electrodynamics	3	0	0	3
			PH 403	Classical Mechanics	3	0	0	3
			PH 404	Quantum Mechanics	2	1	0	3
			PH 405	Modern Computational Techniques & Programming	2	0	0	2
		LABORATORIES						
		PC	PH 406	Modern Computational Techniques & Programming Lab	0	0	4	2
			PH 407	Modern Physics Lab	0	0	4	2
		2	MC	MT204	Constitution of India	2	0	0
Total						21		

Level		Code no.	Name of the subjects	L	T	P	C	
4	II- Semester	THEORY						
		Category						
		PC	PH 408	Statistical Physics	3	1	0	4
			PH 409	Atomic and Molecular Spectroscopy	3	1	0	4
			PH 410	Electronic Devices & Circuits	3	0	0	3
			PH 411	Condensed Matter Physics	3	0	0	3
		OE		Open Elective III	3	0	0	3
		SESSIONAL / LABORATORY						
		PC	PH 412	Electronics Lab	0	0	4	2
			PH 413	Condensed Matter Physics Lab	0	0	4	2
Total						21		

Level	Category	Code no.	Name of the subjects	L	T	P	C	
5	III- Semester	THEORY						
		PC	PH 501	Nuclear and Particle Physics	3	1	0	4
			PH 502	Advanced Quantum Mechanics	3	1	0	4
			PH 503	Laser Physics and Applications	3	1	0	4
		PE	PH 504 to PH 512 (Annexure II)	PE- V One paper from Either Group A or B or C or D or E: Specialization	4	0	0	4
		PE	PH 500 (Annexure II)	Project (Phase-I) from Either Group A or B or C or D or E				4
		LABORATORIES						
		PC	PH 513	Laser Physics Lab	0	0	4	2
						Total	22	

Level	Category	Code no.	Name of the subjects	L	T	P	C	
5	IV- Semester	THEORY						
		PE	PH 513 to PH 530 (Annexure II)	PE - VI: One paper from Either Group A or B or C or D or E: Specialization	4	0	0	4
				PE - VII: One paper from Either Group A or B or C or D or E: Specialization	4	0	0	4
			PH 550	Project (Phase-II) from Either Group A or B or C or D or E				8
Total							16	

Total Credits of M.Sc. Physics (I to IV Semesters) = 80

Note: The contents of laboratory papers are designed to meet the course objectives and outcomes of their respective theory papers.

Annexure II

PE	Pre-requisites	Subjects	
PE -V	One paper from Either Group A or B or C or D or E	Group A- Theoretical and Computational Physics:	
		<ul style="list-style-type: none"> ● Numerical Methods for Physicists ● Theory of Solids 	PH 504 PH 505
		Group B- Condensed Matter Physics:	
		<ul style="list-style-type: none"> ● Theory of Solids ● Functional Materials 	PH 505 PH 506
		Group C – Photonics:	
		<ul style="list-style-type: none"> ● Fiber and Integrated Optics ● Quantum & Nonlinear Optics 	PH 507 PH 508
		Group D- Electronics	
		<ul style="list-style-type: none"> ● Instrumentation and Control ● Physics of Low dimensional Semiconductors Devices 	PH 509 PH 510
		Group E- Plasma Sciences:	
		<ul style="list-style-type: none"> ● Introduction to Plasma Physics ● Plasma Processing of Materials 	PH 511 PH 512
PE -VI to VII	Two papers from any group (Papers shall be chosen from same group in IX and X Semesters)	Group A- Theoretical and Computational Physics:	
		<ul style="list-style-type: none"> ● Theoretical and Computational Fluid Dynamics ● Theoretical and Computational Condensed Matter Physics ● Nonlinear Dynamics and Chaos 	PH 514 PH 515 PH 516
		Group B- Condensed Matter Physics:	
		<ul style="list-style-type: none"> ● Nonconventional Energy Materials ● Cryogenic Physics ● Physics of Thin Films ● Theory of Dielectrics and Ferroics ● Theoretical and Computational Condensed Matter Physics 	PH 517 PH 518 PH 519 PH 520 PH 515
		Group C- Photonics:	
		<ul style="list-style-type: none"> ● Photonic and Optoelectronic Devices ● Holography and Applications ● Quantum photonics and applications ● Introduction to Nanophotonics 	PH 521 PH 522 PH 523 PH 524
		Group D- Electronics:	
		<ul style="list-style-type: none"> ● Microprocessor and Microcontroller Applications ● Integrated Electronics ● Microwave Electronics 	PH 525 PH 526 PH 527
		Group E- Plasma Sciences:	
		<ul style="list-style-type: none"> ● Theory of Plasmas ● Plasma Confinement ● Waves and Instabilities in Plasma ● Physics of Thin Films 	PH 528 PH 529 PH 530 PH 519

M.Sc. Physics (I -IV Semester)

Semester	Subjects	Credit	Total
I	Mathematical Method in Physics	3	21
	Electrodynamics	3	
	Classical Mechanics	3	
	Quantum Mechanics	3	
	Modern Computational Techniques & Programming	2	
	Open Elective I	3	
	Modern Computational Techniques & Programming Lab	2	
	Lab-II (Modern Physics Lab)	2	
II	Statistical Physics	4	21
	Atomic and Molecular Spectroscopy	4	
	Electronics Devices & Circuits	3	
	Condensed Matter Physics	3	
	Open Elective II (Other Dept)	3	
	Lab III (Electronics Lab)	2	
	Labs IV (Condensed Matter Physics Lab)	2	
III	Nuclear and Particle Physics	4	22
	Advanced Quantum Mechanics	4	
	Laser Physics and Applications	4	
	PE-V One paper from Either Group A or B or C or D or E: Specialization	4	Papers shall be chosen from same group in I.MSc. IX and X Semesters
	Project from Either Group A or B or C or D or E	4	
	Lab –V (Laser Physics Lab)	2	
IV	PE-VI One paper from the same Group A or B or C or D or E	4+4	16
	PE - VII One paper from the same Group A or B or C or D or E		
	Project (Phase-II) from Either Group A or B or C or D or E	8	
Total			80

Internship (In-house/External) of at least 2 months should be done by the students (Non-credit)

Course Assessment tools & Evaluation procedure for
Theory Papers **Direct Assessment**

Assessment Tool	% Contribution during CO Assessment
Assignment	10
Seminar before a committee	10
Three Quizzes	30 (10+10+10)
End Sem Examination Marks	50

Indirect Assessment

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Assessment tools & Evaluation procedure for **Laboratory Papers**

Assessment Tool	% Contribution
Progressive Evaluation	(Day to day performance: 30, Quiz: 10, 60 Viva: 20)
End Sem Examination	40 (Experiment Performance: 30, Quiz: 10)