

**NEW COURSE STRUCTURE
in accordance with NEP-2020**

for

**B.Sc. Honors (Physics)
&
I.M.Sc. (Physics)**

(Effective from Academic Year 2024-25)



**Department of Physics
B.I.T. Mesra, Ranchi**

FIRST YEAR						
FIRST SEMESTER						
Course Category	Course code	Course Name	L	T	P	Credit
Major	PH24101	Physics	3	1	0	4
	PH24102	Physics Lab	0	0	2	1
Minor	CS24101	Programming for Problem Solving	3	1	0	4
	CS24102	Programming for Problem Solving Lab	0	0	2	1
	EE24101	Basic Electrical Engineering	2	1	0	3
	EE24102	Electrical Engineering Lab	0	0	2	1
	MA24101	Mathematics - I	3	1	0	4
Multidisciplinary	BE24101	Biological Science for Engineers	2	0	0	2
Ability Enhancement	HS24131	Communication Skills - I	0	0	3	1.5
Value Added	MC24101/102/ 103/104/105	Choice of: NCC/NSS/ PT & Games/ Creative Arts (CA)/Entrepreneurship	0	0	2	1
Total Credits in First Semester						22.5
SECOND SEMESTER						
Course Category	Course code	Course Name	L	T	P	Credit
Minor	EC24101	Basics of Electronics and Communication Engineering	2	1	0	3
	EC24102	Electronics and Communication Lab	0	0	2	1
	MA24103	Mathematics - II	3	1	0	4
Multidisciplinary	CH24101	Chemistry	3	1	0	4
	CH24102	Chemistry Lab	0	0	2	1
	ME24101	Basics of Mechanical Engineering	2	1	0	3
Skill Enhancement	ME24102	Engineering Graphics	0	0	4	2
	PE24102	Workshop Practice	0	0	2	1
Value Added	CE24101	Environmental Science	2	0	0	2
	MC24106/107/ 108/109/110	Choice of: NCC/NSS/ PT & Games/ Creative Arts (CA)/Entrepreneurship	0	0	2	1
Vocational Summer Internship		Hands on training on Vacuum Systems				4
Total Credits in Second Semester						22
Total Credits in First Year						44.5
Total Credits required for Students exiting with Certificate						48.5

SECOND YEAR							
THIRD SEMESTER							
Course Category	Course code	Course Name	L	T	P	Credit	
Major	PH24201	Mechanics	3	0	0	3	
	PH24203	Electricity and Magnetism	3	0	0	3	
	PH24205	Mathematical Physics-I	3	0	0	3	
	PH24207	Waves and Optics	3	0	0	3	
	PH24202	Mechanics Lab	0	0	3	1.5	
	PH24204	Electricity and Magnetism Lab	0	0	3	1.5	
	PH24208	Waves and Optics Lab	0	0	3	1.5	
			Group Discussion / MOOC				2
	Skill Enhancement	SEC242XX	SEC-1 (Annexure-I)	2	0	0	2
Value Added	MC24201/202/ 203/204/205	Choice of: NCC/NSS/ PT & Games/ Creative Arts (CA)/Entrepreneurship	0	0	2	1	
Total Credits in Third Semester						21.5	

FOURTH SEMESTER						
Course Category	Course code	Course Name	L	T	P	Credit
Major	PH24251	Mathematical Physics-II	3	1	0	4
	PH24253	Thermal Physics	3	0	0	3
	PH24255	Digital Systems & Applications	3	0	0	3
	PH24252	Mathematical Physics Lab	0	0	3	1.5
	PH24254	Thermal Physics Lab	0	0	3	1.5
	PH24256	Digital Systems & Applications Lab	0	0	3	1.5
Ability Enhancement	XX24XXX / MO24201	Foreign Language French/German MOOC	0	0	0	3
Skill Enhancement	SEC242XX	SEC-2 (Annexure-II)	2	0	0	2
	SEC242XX	SEC-3 (Annexure-III)	2	0	0	2
Value Added	MC24206/207/208/209/210	Choice of: NCC/NSS/ PT & Games/ Creative Arts (CA)/Entrepreneurship	0	0	2	1
Vocational Summer Internship		Hands on training on 3-D printing and designing (AICTE IDEA Lab)				4
Total Credits in Fourth Semester						22.5
Total Credits in Second Year						44.0
Total Credits required for Students exiting with Diploma						92.5

THIRD YEAR						
FIFTH SEMESTER						
Course Category	Course code	Course Name	L	T	P	Credit
Major	PH24301	Quantum Physics and Applications	3	0	0	3
	PH24303	Solid State Physics	3	0	0	3
	PH24304	Solid State Physics Lab	0	0	3	1.5
	PH243XX	DSE-1 (Annexure-IV)	3	0	0	3
	PH243XX	DSE-1 Lab (Annexure-IV)	0	0	3	1.5
Minor	XX24XXX	ME-1 (Annexure-V)				4.5
Ability Enhancement	HS24133	Communication Skills - II	0	0	3	1.5
Total Credits in Fifth Semester						18.0
SIXTH SEMESTER						
Course Category	Course code	Course Name	L	T	P	Credit
Major	PH24351	Statistical Mechanics	3	0	0	3
	PH24352	Statistical Mechanics Lab	0	0	3	1.5
	PH243XX	DSE-2 (Annexure-VI)	3	1	0	4
	PH243XX	DSE-2 Lab (Annexure-VI)	0	0	3	1.5
	PH243XX	DSE-3 (Annexure-VII)	3	1	0	4
	PH243XX	DSE-3 Lab (Annexure-VII)	0	0	3	1.5
Vocational Summer Internship		Summer Internship (Industry/Institute)	1	0	3	2
Total Credits in Sixth Semester						17.5
Total Credits in Third Year						35.5
Total Credits required for Students exiting with B.Sc. Physics						124

FOURTH YEAR						
SEVENTH SEMESTER						
Course Category	Course code	Course Name	L	T	P	Credit
Major	PH24401	Mathematical Methods in Physics	3	0	0	3
	PH24403	Electrodynamics	3	0	0	3
	PH24405	Classical Mechanics	3	0	0	3
	PH24407	Quantum Mechanics	3	0	0	3
	PH24409	Modern Computational Techniques and Programming	2	0	0	2
	PH24410	Modern Computational Techniques and Programming Lab	0	0	3	1.5
Minor	XX24XXX	ME-2 (Annexure-VIII)				4 - 4.5
Value Added	MT24204	Constitution of India	2	0	0	0
Total Credits in Seventh Semester						19.5 - 20
EIGHTH SEMESTER						
Course Category	Course code	Course Name	L	T	P	Credit
Major	PH24451	Atomic and Molecular Spectroscopy	3	1	0	4
	PH24450	(Research Project/ Dissertation)				12
	OR (Alternative to Research Project / Dissertation)					
	PH24453	Advanced Quantum Mechanics	3	1	0	4
	PH24455	Electronic Devices and Circuits	3	0	0	3
	PH24457	Laser Physics and Applications	3	0	0	3
	PH24456	Electronics Lab	0	0	3	1
	PH24458	Laser Physics Lab	0	0	3	1
Minor	XX24XXX	ME-3 (Annexure-IX)				4 – 5.5
Total Credits in Eighth Semester						20 - 21.5
Total Credits in Fourth Year						40-41
Total Credits required for Students exiting with B.Sc. Physics (Honours) / B.Sc. Physics (Honours with Research) with Minor in chosen discipline						164- 165

FIFTH YEAR						
NINTH SEMESTER						
Course Category	Course code	Course Name	L	T	P	Credit
Major	PH24501	Advanced Nuclear and Particle Physics	3	1	0	4
	PH24503	Advanced Statistical Mechanics	3	1	0	4
	PH24505	Condensed Matter Physics	3	1	0	4
	PH24506	Condensed Matter Physics Lab	0	0	4	2
	PH24508	Spectroscopy Lab	0	0	4	2
	PH245XX	PE-I (ANNEXURE-X)	4	0	0	4
Total Credits in Ninth Semester						20
TENTH SEMESTER						
Course Category	Course code	Course Name	L	T	P	Credit
Major	PH245XX	PE-II (ANNEXURE-XI)	4	0	0	4
	PH245XX	PE-III (ANNEXURE-XI)	4	0	0	4
	PH24550	Project				12
Total Credits in Tenth Semester						20

Total Credits in Fifth Year	40
Total Credits required for I.M.Sc. Physics	204- 205

ANNEXURE-I (Skill Enhancement Courses - I)			
S. No.	Course Code	Course Name	Credits
1	SEC24201	PHYSICS WORKSHOP SKILLS	2
2	SEC24203	ELECTRICAL CIRCUITS AND NETWORK SKILLS	2
ANNEXURE-II (Skill Enhancement Courses - II)			
S. No.	Course Code	Course Name	Credits
1	SEC24251	RADIATION SAFETY	2
2	SEC24253	WEATHER FORECASTING	2
3	SEC24255	BASIC INSTRUMENTATION SKILLS	2
ANNEXURE-III (Skill Enhancement Courses - III)			
S. No.	Course Code	Course Name	Credits
1	SEC24257	COMPUTATIONAL PHYSICS SKILLS	2
2	SEC24259	RENEWABLE ENERGY AND ENERGY HARVESTING	2
3	SEC24261	APPLIED OPTICS	2
ANNEXURE-IV (Discipline Specific Elective - I)			
S. No.	Course Code	Course Name	Credits
1	PH24305	EXPERIMENTAL TECHNIQUES	3
2	PH24307	MATERIALS SCIENCE AND NANOTECHNOLOGY	3
3	PH24309	ATMOSPHERIC PHYSICS	3
4	PH24306	EXPERIMENTAL TECHNIQUES LAB	1.5
5	PH24308	MATERIALS SCIENCE AND NANOTECHNOLOGY LAB	1.5
6	PH24310	ATMOSPHERIC PHYSICS LAB	1.5
ANNEXURE-V (Minor Elective - I)			
S. No.	Course Code	Course Name	Credits
1	CS24263	Data Structures and Algorithm	3
2	CS24264	Data Structures and Algorithm Lab	1.5
3	EC24303	Microprocessor and Microcontroller	3
4	EC24304	Microprocessor and Microcontroller Lab	1.5
5	EE24201	Electrical Measurement and Instrumentation	3

ANNEXURE-VI (Discipline Specific Elective - II)

S. No.	Course Code	Course Name	Credits
1	PH24353	NUCLEAR AND PARTICLE PHYSICS	4
2	PH24355	CLASSICAL DYNAMICS	4
3	PH24357	ELEMENTS OF MODERN PHYSICS	4
4	PH24354	NUCLEAR AND PARTICLE PHYSICS LAB	1.5
5	PH24256	CLASSICAL DYNAMICS LAB	1.5
6	PH24358	ELEMENTS OF MODERN PHYSICS LAB	1.5

ANNEXURE-VII (Discipline Specific Elective - III)

S. No.	Course Code	Course Name	Credits
1	PH24359	NANO MATERIALS AND APPLICATIONS	4
2	PH24361	ADVANCED EXPERIMENTAL TECHNIQUES	4
3	PH24363	BIOPHYSICS	4
4	PH24360	NANO MATERIALS AND APPLICATIONS LAB	1.5
5	PH24362	ADVANCED EXPERIMENTAL TECHNIQUES LAB	1.5
6	PH24364	BIOPHYSICS LAB	1.5

ANNEXURE-VIII (Minor Elective - II)

S. No.	Course Code	Course Name	Credits
1	CS24450	Mini Project	4
2	EC24331	Communication System	3
3	EC24332	Communication System Lab	1
4	EE24205	Circuit Theory	4
5	CS24206	Design and Analysis of Algorithm	3
6	CS24207	Design and Analysis of Algorithm Lab	1.5

ANNEXURE-IX (Minor Elective - III)

S. No.	Course Code	Course Name	Credits
1	IT24263	Object Oriented Programming	3
2	IT24264	Object Oriented Programming Lab	1.5
3	EC24355	Fiber Optic Communication	3
4	EC24356	Fiber Optic Communication Lab	1.5
5	EE24261	Principles of Electrical Machines	4
6	EE24252	Electrical Machine Laboratory - I	1.5
7	MA24311	Numerical Techniques	4

ANNEXURE-X (Specialization Elective - I)

S. No.	Course Code	Course Name	Credits
GROUP-A (Theoretical Physics)			
1	PH24511	NUMERICAL METHODS FOR PHYSICISTS	4
2	PH24513	ADVANCED MATHEMATICAL METHODS	4
GROUP-B (Condensed Matter Physics)			
3	PH24515	THEORY OF SOLIDS	4
4	PH24517	FUNCTIONAL MATERIALS	4
GROUP-C (Photonics)			
5	PH24519	FIBER AND INTEGRATED OPTICS	4
6	PH24521	PHOTONIC AND OPTOELECTRONIC DEVICES	4
GROUP-D (Electronics & Instrumentation)			
7	PH24523	INSTRUMENTATION AND CONTROL	4
8	PH24525	PHYSICS OF LOW DIMENSIONAL SEMICONDUCTORS DEVICES	4
GROUP-E (Plasma Physics)			
9	PH24527	INTRODUCTION TO PLASMA PHYSICS	4
10	PH24529	PLASMA PROCESSING OF MATERIALS	4
GROUP-F (Biophysics)			
11	PH24531	INTRODUCTION OF BIOPHYSICS AND BIOMATERIALS	4
12	PH24533	QUANTITATIVE BIOLOGY	4

ANNEXURE-XI (Specialization Elective - II & III)

S. No.	Course Code	Course Name	Credits
GROUP-A (Theoretical Physics)			
1	PH24551	NONLINEAR DYNAMICS AND CHAOS	4
2	PH24553	NONEQUILIBRIUM STATISTICAL PHYSICS	4
3	PH24555	GRAVITATION AND COSMOLOGY	4
4	PH24557	QUANTUM FIELD THEORY	4
GROUP-B (Condensed Matter Physics)			
5	PH24559	NONCONVENTIONAL ENERGY MATERIALS	4
6	PH24561	PHYSICS OF THIN FILMS	4
7	PH24563	THEORY OF DIELECTRICS AND FERROICS	4
8	PH24565	TOPOLOGICAL QUANTUM MATERIALS	4
9	PH24567	PHYSICS OF SOLID STATE DEVICES	4
GROUP-C (Photonics)			
10	PH24569	QUANTUM & NONLINEAR OPTICS	4
11	PH24571	HOLOGRAPHY AND APPLICATIONS	4
12	PH24573	QUANTUM PHOTONICS AND APPLICATIONS	4
13	PH24575	NANOPHOTONICS	4
GROUP-D (Electronics & Instrumentation)			
14	PH24577	MICROPROCESSOR AND MICROCONTROLLER APPLICATIONS	4
15	PH24579	INTEGRATED ELECTRONICS	4
16	PH24581	MICROWAVE ELECTRONICS	4
GROUP-E (Plasma Physics)			
17	PH24583	THEORY OF PLASMAS	4
18	PH24585	PLASMA CONFINEMENT	4
19	PH24587	WAVES AND INSTABILITIES IN PLASMA	4
GROUP-F (Biophysics)			
17	PH24589	BIOCONVERGENCE	4
18	PH24591	BIOMECHANICS AND BIOINFORMATICS	4
19	PH24593	ADVANCED BIOMATERIALS AND CHARACTERIZATION	4