

**Course Structure of B. Tech. Programme
in
Engineering Physics
(From AY 2023-24 onwards)**

Course structure of B.Tech. 1st year

Semester I

Course Code	Course Title	Weekly Contact Hours (L-T-P)	Credits
EE 1XX	Basic Electrical Engineering	1-1-0	2
ME 1XX	Engineering Mechanics	2-0-0	2
PH 101	Basics of Physics	2-1-0	3
PH 156	Physics Lab- I	0-0-2	1
MA 105 (A)	Calculus-I (half Semester)	3-1-0 (=4/2)	2
MA 105 (B)	Calculus-II (half Semester)	3-1-0 (=4/2)	2
CH 103	Chemistry	3-0-0	3
CH 153	Chemistry Lab	0-0-2	1
HS 1XX	Language and Composition	2-0-0	2
ZXXX	Flexible Elective (HSS)	1-0-0	1
NO 101	National Sports Organization (NSO)	0-0-0	P/NP
Total		14-3-4	19

Semester II

Course Code	Course Title	Weekly Contact Hours (L-T-P)	Credits
BSE 102	Biosciences	2-1-0	3
MA 106 (A)	Linear Algebra (half Semester)	2-1-0 (=3/2)	1.5
MA 106 (B)	Differential Equations-I (half Semester)	2-1-0 (=3/2)	1.5
ES 1XX	Environmental Studies: Scientific and Engineering Aspects (half Semester)	2-1-0 (=3/2)	1.5
HS 1XX	Environmental Studies: Social Aspects (half Semester)	2-1-0 (=3/2)	1.5
HS 108	Fundamentals of Economics	2-0-0	2
IC 1XX	Makerspace	1-0-6	4
CS 103	Computer Programming	2-0-0	2
IC 151	Computer Programming Lab	0-0-3	1.5
ZXXX	Flexible Elective	1-0-0	1
ZXXX	Flexible Elective	1-0-0	1
ZXXX	Flexible Elective (HSS)	1-0-0	1
NO 101	National Sports Organization (NSO)	0-0-0	P/NP
Total		14-3-9	21.5

2nd Year B.Tech. in Engineering Physics

Semester III

Course Code	Course Title	Weekly Contact Hours (L-T-P)	Credits
ZZXXX	Course -I for minor program	X-X-X	3
MA 203	Complex analysis and Differential Eqns-II	3-1-0	4
PH 201	Classical Mechanics	2-1-0	3
PH 241	Wave Phenomena and Optics	2-1-0	3
PH 291	Electronics-I	2-1-0	3
PH 221	Fundamental Concepts of Solid State Engineering	2-1-0	3
PHXXX	Elective-I	2-1-0	3
PH 293	Physics Lab-II (General Physics Lab)	0-0-3	1.5
PH 295	Electronics Lab-I	0-0-3	1.5
Total		13-6-6	22/25

Semester IV

Course Code	Course Title	Weekly Contact Hours (L-T-P)	Credits
ZZXXX	Course II for minor program	X-X-X	3
MA 204	Numerical Methods	2-0-2	3
PH 210	Quantum Mechanics-I	2-1-0	3
PH 222	Thermal Physics	2-1-0	3
PH 290	Electronics -II	2-1-0	3
PH 301	Electrodynamics	1-1-0	2
PHXXX	Elective -II	2-1-0	3
PH 292	Electronics Lab-II	0-0-3	1.5
IE XXX	Open elective -I	2-1-0	3
Total		13-6-5	21.5/24.5

3rd Year B.Tech. in Engineering Physics

Semester V

Course Code	Course Title	Weekly Contact Hours (L-T-P)	Credits
ZZXXX	Course III for minor program	X-X-X	3
PH 361	Nuclear Science and Engineering	2-1-0	3
PH 311	Quantum Mechanics - II	2-1-0	3
PH 313	Advanced Classical Mechanics	1-0.5-0	1.5
PH 351	Topics in Mathematical Physics	1-0.5-0	1.5
PH XXX	Computational Techniques	2-0-2	3
PH XXX	Elective-III	2-1-0	3
PH 391	Physics lab III (Advanced Physics Lab)	0-0-3	1.5
IEXXX	Open elective -II	2-1-0	3
Total		12-5-5	19.5/22.5

Semester VI

Course Code	Course Title	Weekly Contact Hours (L-T-P)	Credits
PH 322	Cooperative Phenomena in Solids	2-1-0	3
PH 320	Statistical Mechanics	2-1-0	3
PH 340	Atomic and Molecular Spectroscopy	2-1-0	3
PH 390	UG Seminar	0-1-0	1
PH XXX	Elective-IV	2-1-0	3
PH XXX	Elective-V	2-1-0	3
PH 392	Physics Lab IV (Solid State Engineering Lab)	0-0-3	1.5
PH 394	Physics lab V (Spectroscopy and Microscopy)	0-0-3	1.5
IE XXX	Open elective -III	2-1-0	3
Total		12-7-4	22

4th Year B.Tech. in Engineering Physics

Semester VII

Course Code	Course Title	Weekly Contact Hours (L-T-P)	Credits
PH 499	B Tech Project (BTP) Students can do BTech project either outside the institute or within the institute under the supervision of an IIT Indore Faculty.	0-0-32	16
	Internship-I		1
	Internship-II		1
Total		0-0-32	18

Semester VIII

Course Code	Course Title	Weekly Contact Hours (L-T-P)	Credits
PH 4XX	PH elective VI	2-1-0	3
PH 4XX	PH elective VII	2-1-0	3
IE4XX	Open elective IV	2-1-0	3
IE4XX	Open elective V (or course IV for minor program)	2-1-0	3
IE4XX	Open elective VI (or course V for minor program)	2-1-0	3
Total		10-5-0	15

List of Flexible Elective for B.Tech. 1st Year

Semester I

Course Code	Course Title	Teaching Hours (L-T-P)	Credits
HS 1XX	Stress and Mental Health	1-0-0	1
HS 1XX	Frontiers of Thinking	1-0-0	1
HS 1XX	History of Tribal and Folk Art	1-0-0	1
HS 1XX	Cultural Sociology	1-0-0	1

Semester II

Course Code	Course Title	Teaching Hours (L-T-P)	Credits
EE 1XX	Basic Electronics Engineering	1-0-0	1
ME 1XX	Basic Manufacturing Processes	1-0-0	1
ME 1XX	Basic Thermal Engineering	1-0-0	1
PH 1XX	Basics of Laser Engineering	1-0-0	1
HS 1XX	Stress and Mental Health	1-0-0	1
HS 1XX	Frontiers of Thinking	1-0-0	1
HS 1XX	History of Tribal and Folk Art	1-0-0	1
HS 1XX	Cultural Sociology	1-0-0	1
AA 101	Introduction to Space Engineering	1-0-0	1
CE 1XX	Computations in Civil Engineering	1-0-0	1
MM 1XX	Introduction to Materials Engineering	1-0-0	1

List of the Elective Courses for BTech in Engineering Physics

Semester III				
S. No.	Courses	Weekly Contact Hours (L-T-P)	Credits	Direction
1	Vacuum and Thin Films Technology	(2-1-0)	3	Energy Conversion and Storage, Spintronics and Memory Devices, Optoelectronics, Materials and Device Modelling
2	Detector Physics	(2-1-0)	3	Experimental HEP, Detector Technology, Nuclear Engineering, Theoretical HEP, Medical Physics
3	General theory of Relativity	(2-1-0)	3	Theoretical HEP
4	Theory of Complex Systems	(2-1-0)	3	Data Science

List of the Elective Courses for BTech in Engineering Physics

Semester IV				
S. No.	Course	Weekly Contact Hours (L-T-P)	Credits	Direction
1	Later Physics	(2-1-0)	3	Optoelectronics and Photonics Quantum Technology
2	X Ray Spectroscopy	(2-1-0)	3	Energy Conversion and storage Spintronics and Memory devices
3	Classical Field theory	(2-1-0)	3	Theoretical HEP, Experimental HEP
4	Accelerator Physics	(2-1-0)	1	Experimental HEP, Nuclear Engineering, Medical Physics

5	Relativistic Kinematics	(2-1-0)	1	Theoretical HEP, Experimental HEP
6	Python Programming	(2-1-0)	1	Experimental HEP, Quantum Technology

List of the Elective Courses for BTech in Engineering Physics

Semester V				
S. No.	Course	Weekly Contact Hours (L-T-P)	Credits	Direction
1	Advanced Crystal Physics and Engineering	(2-1-0)	2	Materials and Device modelling
2	Physics of Semiconductor Devices	(2-1-0)	3	Energy Conversion and Storage
3	Topics in Advanced Quantum Mechanics	(2-1-0)	3	Theoretical HEP, Quantum Technology
4	Computation Methods in High Energy Physics	(2-1-0)	3	Experimental HEP
5	Signal Processing	(2-1-0)	3	Quantum Technology
6	Advanced Materials	(2-1-0)	3	Spintronics and Memory Devices

List of the Elective Courses for BTech in Engineering Physics

Semester VI				
S. No.	Course	Weekly Contact Hours (L-T-P)	Credits	Direction
1	Quantum Transport Theory and Applications	(2-1-0)	3	Spintronics and Memory Devices
2	Characterization of Surfaces and Interfaces of Materials	(2-1-0)	3	Spintronics and Memory Devices
3	Principles and applications of Optical Spectroscopy	(2-1-0)	3	Optoelectronics,
4	Solar Photovoltaics: Fundamentals, Technologies and Applications	(2-1-0)	3	Energy Conversion and storage
5	Quantum Field theory -1	(2-1-0)	3	Theoretical HEP, Experimental HEP
6	Applications of Group Theory in Particle Physics	(2-1-0)	3	Theoretical HEP
7	Introduction to String Theory	(2-1-0)	3	Theoretical HEP
8	Deep Inelastic Scattering and Parton Model	(2-1-0)	3	Theoretical HEP, Experimental HEP
9	Experimental and theoretical aspects of Heavy Ion Collisions	(2-1-0)	3	Experimental HEP, Theoretical HEP
10	Statistical Methods in physical Sciences	(2-1-0)	3	Experimental HEP, Data Science, Theoretical HEP
11	Basics of Quantum Computing	(2-1-0)	3	Quantum Technology
12	Machine Learning in Physical problems	(2-1-0)	3	Data Science, Quantum Technology, Experimental HEP
13	Quantum Information	(2-1-0)	3	Quantum Technology

List of the Elective Courses for BTech in Engineering Physics

Semester VIII				
S.No.	Course	Weekly Contact Hours (L-T-P)	Credits	Direction(s)
1	Spintronics and Applications	(2-1-0)	3	Spintronics and Memory Devices
2	Advanced Computational Methods for Materials	(2-1-0)	3	Materials and Device modelling
3	Weak Interaction and the Standard Model	(2-1-0)	3	Theoretical HEP, Experimental HEP
4	Flavor Physics and Neutrino Oscillations	(2-1-0)	3	Theoretical HEP
5	Introduction to Gauge Gravity Duality	(2-1-0)	3	Theoretical HEP
6	Quantum Field theory -II	(2-1-0)	3	Theoretical HEP
7	Introduction to Cosmology	(2-1-0)	3	Theoretical HEP
8	Collider Physics	(2-1-0)	3	Theoretical HEP, Expt HEP
9	Physics of Dark Matter	(2-1-0)	3	Theoretical HEP
10	Astroparticle Physics and Neutrino Astronomy	(2-1-0)	3	Theoretical HEP
11	Machine Learning in Physical problems	(2-0-2)	3	Data Science, Quantum Technology, Experimental HEP