Department of Physics

Furkating college(Autonomous),Furkating,Golaghat,785610,Assam,India

SYLLABUS for FOUR YEAR UNDERGRADUATE PROGRAMME (FYUGP) in PHYSICS of Furkating college(Autonomous)
as per NEP-2020 Guidelines

Approved by the Board of Studies in Physics held on 18 july, 2023

Preamble

The National Education Policy (NEP 2020) is a groundbreaking initiative approved by the Union Cabinet of India on 29th July 2020. Its central aim is to overhaul the antiquated education system and achieve the ambitious aspirations of modern education in the 21st century. The NEP 2020 envisions a transformative shift towards holistic and multidisciplinary undergraduate education, which can produce versatile, reflective, and inventive individuals. . The process began with the publication of a general program structure for the Four Year Undergraduate Programme (FYUGP) for all disciplines, in accordance with the UGC's FYUGP Curriculum and Credit Framework, on 27th January 2023. In keeping with the NEP 2020, theBoard of Studies (BoS) in Physics, convened on 18th july 2023, endorsed the detailed program structure and syllabus for FYUGP in Physics, designed for Furkating college(Autonomous). This syllabus intends to provide students with a comprehensive understanding of the discipline, enable them to hone critical thinking and problem-solving skills, and equip them to tackle the demands and prospects of the 21st century.

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INTRODUCTION

The NEP-2020 presents a unique opportunity to revolutionize the higher education system in India by shifting the focus from teachers to students. This policy promotes Outcome-Based Education, where the desired graduate attributes serve as the foundation for designing programs, courses, and supplementary activities that enable students to achieve the desired learning outcomes. The curriculum framework for the FYUGP in Physics aims to provide a strong foundation in the subject and equip students with valuable cognitive abilities and skills necessary for success in diverse professional careers in a developing and knowledge-based society. The framework adheres to globally competitive standards of knowledge and skills in Physics while emphasizing the development of scientific orientation, an enquiring spirit, problem-solving skills, and values that promote rational and critical thinking.

The FYUGP in Physics offered by Furkating college(Autonomous) is a comprehensive and challenging curriculum that aims to provide students with a strong foundation in the discipline while exposing them to cutting-edge developments in the field. The program's structure is multidisciplinary, allowing students to explore the intersections between physics and other fields of study. This

approach provides students with a broader perspective and helps them understand the interconnectedness of various areas of knowledge. The program also aims to promote students' personal and professional growth by motivating them to engage in co-curricular and extracurricular activities, which will help them develop essential skills like leadership, teamwork, and communication.

The program's syllabus is designed to promote critical thinking, develop problem-solving abilities, and encourage creativity. It includes laboratory work and practical exercises that give students the opportunity to apply theoretical concepts to real-world problems and enhance their scientific skills. The program also emphasizes the importance of ethics, social responsibility, and sustainable development, instilling in students a sense of responsibility towards society and the environment.

The FYUGP program in Physics at Furkating college(Autonomous) is designed to prepare students for the challenges and opportunities of the 21st century. The program's multidisciplinary and holistic approach equips students with the skills and knowledge necessary for success in a rapidly changing world. Its commitment to social responsibility and sustainable development reflects its mission to produce not only accomplished physicists but also responsible andethical global citizens.

The NEP 2020 promotes multidisciplinary education in the undergraduate program that integrates social sciences, arts and humanities with science, technology, engineering and mathematics. For holistic development of individuals it requires to develop all capacities of human beings including intellectual, social, physical, emotional and moral behavior. Individuals should be acquainted in fields across the arts, humanities, languages, sciences and social sciences; professional, technical and vocational fields; soft skills, such as communication, discussion and debate etc.. In order to develop such holistic and multidisciplinary education, the curriculum and credit framework for the FYUGP in Physics are designed accordingly. The FYUGP in Physics consists of six different types of courses- (i) Core courses, (ii) Minor courses, (iii) Generic elective courses (GEC), (iv) Ability enhancement courses (AEC), (v) Value added courses (VAC) and (vi) Skill enhancement courses (SEC).

As per NEP's recommendations the FYUGP in Physics also features multiple exit options-

1. A certificate after completing 1 year of study
2. A diploma after completing 2 years of study
3. A Bachelor's degree after completion of a 3-year programme
4. A 4-year multidisciplinary Bachelor's degree

AIM AND OBJECTIVES

The goals and objectives of FYUGP should aim to:

1. Establish an environment in all educational institutions that consolidates the knowledge obtained at the secondary level and inspires students to develop a profound interest in Physics, acquire a broad and balanced understanding of physical concepts, principles, and theories of Physics.
2. Learn, design, and conduct experiments in laboratories to demonstrate the concepts, principles, and theories learned in the classroom.
3. Develop the ability to apply the knowledge gained in the classroom and laboratories to

specific problems in theoretical and experimental Physics.

4. Expose students to the vast scope of Physics as a theoretical and experimental science with applications in solving most of the problems in nature, spanning from infrared to ultraviolet regimes.
5. Emphasize Physics as the most critical branch of science to pursue interdisciplinary and multidisciplinary higher education and research in interdisciplinary and multidisciplinary areas.
6. Emphasize the importance of Physics as the most critical discipline for sustaining existing industries and establishing new ones, creating job opportunities at all employment levels.

The proposed curriculum should enable students to acquire knowledge and skills necessary to solve problems progressively from novice problem solvers at entry level to expert problem solvers at graduation. Specifically, by the end of the first year, students should have the ability to solve well-defined problems, while at the end of the second year, they should be able to solve broadly defined problems. By the end of the third year, they should be able to solve complex problems that are ill-structured, requiring multidisciplinary skills to solve them. During the fourth year, students should gain experience in workplace problem solving in the form of internships, research experience to prepare for higher education, or entrepreneurship experience.

Assessment Methods

The outcome-based education emphasizes the importance of measuring the learning outcomes of students. Assessment is an integral part of the pedagogy for FYUGP in Physics. The assessment methods used are designed to evaluate the understanding of the subject matter, the ability to apply theoretical knowledge to practical situations, and the development of critical thinking skills.

All the Core and Minor courses of the FYUGP in Physics are designed with 4 credits, while those of Generic Elective and Skill Enhancement courses (GEC and SEC) are 3-credit courses. The entire assessment of a 3-credit / 4-credit course will be performed over a total of 100 marks, out of which 80 marks is allotted to an End-semester examination and the rest of 20 marks is assigned to an In-semester assessment. The total of 80 marks in the End-semester examination for a particular course is distributed over different units as per corresponding weightage and content of the unit. The question paper should contain short answer type questions, problem solving questions and descriptive type questions. The In-semester evaluation should be done in a

continuous mode throughout the semester. It could be done through class tests, internal examinations, homework assignment, regularity and attendance, classroom interaction, quiz, powerpoint presentation etc.. Half of the total 20 marks of the In-semester assessment is assigned to an internal examination and the remaining 10 marks are to be evaluated on the basis of homework assignment / attendance / classroom interaction /quiz / powerpont presentation etc.

COURSE STRUCTURE

Year	Semester	Course	Title of the Course	Total Credits
Year 01	**1st Semester**	**C - 1**	Mechanics and Properties of Matter	4
		Minor 1	Mechanics (for disciplines other than Physics)	4
		GEC - 1	Evolution of Science / Introduction to Communication Technology	3
		AEC - 1	Modern Indian Language	4
		VAC - 1	Understanding India	2
		VAC - 2	Health and Wellness	2
		SEC - 1	Electrical circuits and Network Skills / Electrical Wiring and Maintenance	3
			Total of Semester 1	**22**
	2nd Semester	**C - 2**	Waves and Optics	4
		Minor 2	Waves and Optics (for disciplines other than Physics)	4
		GEC - 2	Materials Today / Digital and Space Technologies	3
		AEC - 2	English Language and Communication Skills	4

		VAC - 3	Environmental Science	2
		VAC - 4	Yoga Education	2
		SEC - 2	Basic Instrumentation Skills	3
			Total of Semester 2	**22**
	Grand Total (Semester 1 and 2)			**44**
Students on exit shall be awarded Undergraduate Certificate (in the field of study/ discipline) after securing the requisite 44 credits in Sem 1 and 2 provided they secure 4 credits in work based vocational courses offered during summer term or internship/ apprenticeship in addition to 6 credits from skill based courses earned during 1st and 2nd Semester				
Year 02	**3rd Semester**	**C - 3**	Mathematical Physics I	4
		C - 4	General Lab I	4
		Minor 3	General Lab I (for disciplines other than Physics)	4
		GEC - 3	The Universe / Atmosphere of the Earth	3
		AEC - 3	Communicative English / Mathematical Ability	2
		VAC - 5	Digital and Technological Solutions / Digital Fluency	2
		SEC - 3	Computational Physics Skills / Renewable Energy and Energy harvesting	3
			Total of Semester 3	**22**

Abbreviations used:

1. C = Major
2. GEC = Generic Elective Course / Multidisciplinary Course
3. AEC = Ability Enhancement Course
4. SEC = Skill Enhancement Course
5. VAC = Value Added Course

List of Major Core Courses:

1. C - 1: Mechanics and Properties of Matter
2. C - 2: Waves and Optics
3. C - 3: Mathematical Physics I
4. C - 4: General Lab I
5. C - 5: Electricity and Magnetism
6. C - 6: Thermal Physics
7. C - 7: Elements of Modern Physics
8. C - 8: General Lab II
9. C - 9: Mathematical Physics II
10. C - 10: Quantum Mechanics I
11. C - 11: Statistical Mechanics
12. C - 12: Computation Lab
13. C - 13: Electromagnetic Theory
14. C - 14: Solid State Physics I
15. C - 15: Electronics I
16. C - 16: General Lab III
17. C - 17: Mathematical Physics III
18. C - 18: Classical Mechanics
19. C - 19: Quantum Mechanics II
20. C - 20: Electronics II
21. C - 21: Solid State Physics II
22. C - 22: Atomic and Molecular Physics

List of Generic Elective Courses:

1. GEC - 1: Evolution of Science / Introduction to Communication Technology
2. GEC - 2: Materials Today / Digital and Space Technologies
3. GEC - 3: The Universe / Atmosphere of the Earth

List of Skill Enhancement Courses:

1. SEC - 1: Electrical circuits and Network Skills / Electrical Wiring and Maintenance

2. SEC - 2: Basic Instrumentation Skills
3. SEC - 3: Computational Physics Skills / Renewable Energy and Energy harvesting

List of Minor Courses:

1. Minor - 1: Mechanics
2. Minor - 2: Waves and Optics
3. Minor - 3: General Lab I
4. Minor - 4: Electricity and Magnetism
5. Minor - 5: Thermal Physics
6. Minor - 6: General Lab II
7. Minor - 7: Elements of Modern Physics
8. Minor - 8: Solid State Physics

Detailed Syllabus of 1st Semester Major Courses

Course title: Mechanics and Properties of Matter
Course code: PHYS-MA-1014
Nature of the course:MAJOR
Total credits: 4
Distribution of marks: 80 (End sem) **+ 20** (In-sem)

Unit	Content	L	T	P	M	Hours
Unit 1: Newtonian Mechanics	**1.1:** Frames of Reference, Inertial Frames, Galilean Transformations, Galilean Invariance; Dynamics of a System of Particles, Centre of Mass, Principle of Conservation of Linear Momentum.	6	-	-	8	6
	1.2: The Work-Energy Theorem,	6	-	-	8	6

	, Work done by conservative and non-conservative forces,Conservation of mechanical energy, Force as gradient of potential energy, Energy Diagram, Stable and Unstable Equilibrium					
	1.3: Rotation about a fixed axis, Moment of Inertia, Calculation of Moment of Inertia for rectangular, cylindrical and spherical bodies,Angular momentum and its conservation, Kinetic Energy of Rotation, Motion involving both translation and rotation.	8	-	-	12	8
Unit 2: Properties of Matter	2.1: Relation between Elastic constants, Twisting torque on a Cylinder or Wire.	4	-	-	5	4
	2.2: Kinematics of Moving Fluids, Poiseuille's Equation for Flow of a Liquid through a Capillary Tube	4	-	-	5	4
Unit 3:Oscillations	Simple Harmonic Motion (SHM) and Oscillations, Differential Equation of SHM and its solution, Kinetic Energy, Potential Energy, Total energy and their time-average values, Damped oscillation, Forced oscillations, Resonance, Power Dissipation and Quality Factor.	8	-	-	12	8
Unit:4 Non inertia systems	Non inertial frames and fictitious forces,Uniformlu rotating frame,Laws of physics in a rotating co-ordinate systemCentrifugal force,Coriolis force and its application,components of velocity and acceleration in cylindrical and spherical co-ordinate system	8	-	-	10	8
Unit 5: Special Theory of Relativity	Michelson-Morley Experiment and its outcome, Postulates of Special Theory of Relativity, Lorentz Transformations, Simultaneity and order of events, Length contraction, Time dilation. Relativistic Transformation of Velocity,frequency and wave number, Relativistic addition of velocities,Variation of mass with velocity,mass-energy equivalence,Relativistic kinematics,Transformation of energy and momentum,Relativistic Doppler effect	16	-	-	20	16
	Total	**60**	**-**	**-**	**80**	**60**

(L= Lecture, T= Tutorial, P= Practical, M= Marks)

Detailed Syllabus of 2nd Semester Major Courses

Course title: Waves and Optics
Course code:PHYS-MA-2014

Nature of the course:
MAJOR

TOTAL CREDITS:4
Distribution of Marks: 80 (End sem) **+ 20** (In-sem)

Unit	Content	L	T	P	M	Hours
Unit 1: Superposition of Harmonic Oscillations	**1.1:** Linearity and Superposition Principle. Superposition of two collinear oscillations having equal frequencies and different frequencies (Beats). Superposition of N collinear Harmonic Oscillations with equal phase differences and equal frequency differences.	5	-	-	6	5
	1.2: Graphical and Analytical Methods. Lissajous Figures with equal and unequal frequency and their use.	3	-	-	4	3
Unit 2: Wave Motion	**2.1:** Plane and Spherical Waves, Longitudinal and Transverse Waves, Plane Progressive (Travelling) Waves, Wave Equation, Particle and Wave Velocities, Differential Equation of a Wave, Pressure of a Longitudinal Wave, Energy Transport, Intensity of Wave,Wave packet,phase and group velocities	6	-	-	8	6
	2.2: Velocity of Transverse Vibrations of Stretched Strings, Velocity of Longitudinal Waves in a Fluid in a Pipe, Newton's Formula for Velocity of Sound, Laplace's Correction.	5	-	-	8	5
Unit 3: Harmonic Waves	Standing Waves in a String, Energy of Vibrating String, Transfer of Energy,Normal Modes of Stretched Strings, Plucked and Struck Strings, Melde's Experiment, Longitudinal Standing Waves and Normal Modes, Open and Closed Pipes, Superposition of N Harmonic Waves.	7		-	10	7

Unit 4: Wave optics	Electromagnetic nature of light, definition and properties of wave front, Huygens principle, Temporal and Spatial coherence	3	-	-	4	3
Unit 5: Interference	**5.1:** Division of amplitude and wavefront, Young's double slit experiment, Lloyd's Mirror and Fresnel's Biprism, Phase change on reflection: Stokes' treatment, Interference in Thin Films: parallel and wedge-shaped films. Newton's Rings: Measurement of wavelength and refractive index	8	-	-	10	8
	5.2: Michelson Interferometer- (i) Idea of form of fringes (No theory required), (ii) Determination of Wavelength, (iii) Wavelength Difference, (iv) Refractive Index and (v) Visibility of Fringes. Fabry-Perot interferometer.	4	-	-	6	4
Unit 6: Diffraction	**6.1:**Frounhoffer diffraction:single slit,circular aperature,rsolving power of Telescope,Double slit ,multiple slits,Diffraction gratting,resolving power of gratting	8	-	-	**9**	**8**
	6.2 Frasnel diffraction:Frasnel"s assumption,Frasnel"s half period zones for plane waves Explanation of rectilinear propagation of light,Theory of a zone plate,Multiple foci of a zone plate,Frasnel"s integral,Frasnel diffraction pattern of straight edge, a slit and a wire	**7**	-	-	**9**	**7**
Unit 7: Holography	Principle of holography,recording and reconstruction method,theory of holography as interference between two plan waves,point source holograms	**4**	-	-	**6**	**4**
	Total	**60**	-	-	**80**	**60**

(L= Lecture, T= Tutorial, P= Practical, M= Marks)

Detailed Syllabus of 3rd Semester Major Courses

Course title: Mathematical Physics – I
Nature of the course: Major

Course coad:PHYS-MA-3014

Credit;4
Distribution of Marks: 80 (End sem) **+ 20** (In-sem)

Unit	Content	L	T	P	M	Hours

Unit 1: Calculus	**1.1:** Functions and their plotting, Continuity and Differentiability of functions, Approximation methods: Taylor series, Maclaurin series.	2	-	-	4	2
	1.2: First Order Differential Equations, Integrating Factor, Second Order Differential Equations, Homogeneous and Inhomogeneous Equations with constant coefficients. Wronskian and general solution. Statement of existence and Uniqueness Theorem for Initial Value Problems. Particular Integral.	10	-	-	14	10
	1.3: Calculus of functions of more than one variable: Partial Derivatives, Exact and Inexact Differentials, Integrating Factor, Constrained Maximization using Lagrange Multipliers.	6	-	-	8	6
Unit 2: Vector Calculus	**2.1:** Recapitulation of Vector algebra, Dot Product, Cross Product, Scalar Triple Product, Cartesian Components of a vector, Scalar and Vector Fields.	2	-	-	4	2
	2.2: Vector Differentiation: Directional Derivatives and Normal Derivative, Gradient of a Scalar Field and its geometrical interpretation, Divergence and Curl of a Vector Field,Vector identities.	8	-	-	10	8
	2.3 Vector Integration:Line, Surface and Volume, Integrals of Vector Fields, Flux of a Vector Field, Gauss' Divergence Theorem, Green's and Stokes Theorems and their applications (no rigorous proofs).	14	-	-	16	14
Unit 3: Orthogonal Curvilinear Coordinates	Orthogonal Curvilinear Coordinates, Spherical Polar Coordinates, Cylindrical Coordinates; Derivation of Gradient, Divergence and Curl in Cartesian, Spherical and Cylindrical Coordinate Systems	8	-	-	12	8
Unit 4: Dirac Delta Function	Definition of Dirac Delta Function, Representation as limit of a Gaussian function and Rectangular function, Properties of Dirac Delta Function.	4	-	-	4	4

Unit 5: Matrices	Definition, Addition and Multiplication of matrices, Transpose of a matrix, Hermitian conjugate of a matrix, Trace and Determinant, Inverse of a matrix, Special types of square matrices- Diagonal, Symmetric and Skew-symmetric, Hermitian and Skew-hermitian.	6	-	-	8	6
	Total	**60**	**-**	**-**	**80**	**60**

(L= Lecture, T= Tutorial, P= Practical, M= Marks)

Course title: General Lab I

Nature of the course:Major

Course coad:

PHYS-MA-3024

TOTAL CREDITS:4

Distribution of Marks: 80 (End sem) **+ 20** (In-sem)

Unit	Content	L	T	P	M	Hours
	List of experiments					
Unit 1: Mechanics	(1) To determine the height of a building using a Sextant. (2) To study the Motion of Spring and calculate (a) Spring constant, (b) ***g*** and (c) Modulus of rigidity. (3) To determine the Moment of Inertia of a Flywheel. (4) To determine ***g*** and velocity for a freely falling body using Digital Timing Technique. (5) To determine Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille's method). (6) To determine the Young's Modulus of a Wire by Optical Lever Method. (7) To determine the Modulus of Rigidity of a Wire by Maxwell's needle. (8) To determine the elastic Constants of a wire by Searle's method. (9) To determine the value of ***g*** using Bar Pendulum. (10)To determine the value of ***g*** using Kater's Pendulum.	-	-	30	40	60
Unit 2: Waves and	(1) To determine the frequency of an electric tuning fork by Melde's experiment and verify λ^2 –T	-	-	30	40	60

Optics	law. (2) To determine the phase difference between two waves using Lissajous Figures. (3) To determine the refractive index of the Material of a prism using sodium source. (4) To determine the dispersive power and Cauchy constants of the material of a prism using mercury source. (5) To determine the wavelength of sodium source using Michelson's interferometer. (6) To determine wavelength of sodium light using Fresnel Biprism. (7) To determine wavelength of sodium light using Newton's Rings. (8) To determine the thickness of a thin paper by measuring the width of the interference fringes produced by a wedge-shaped Film. (9) To determine wavelength of (1) Na source and (2) spectral lines of Hg source using plane diffraction grating. (10) To determine dispersive power and resolving power of a plane diffraction grating.					
	Total	**-**	**-**	**60**	**80**	**120**

(L= Lecture, T= Tutorial, P= Practical, M= Marks)

At least 60% of the experiments must be performed from each unit.

Mode of In-semester assessment:

1. Viva-voce: (**Marks 10)**
2. Attendance / Laboratory performance / Notebook: **(Marks 10)**

Detailed Syllabus of Minor Courses

Course title: Mechanics and properties of mater

Nature of course:Minor

Course coad:PHYS-MI-1014

Distribution of marks: 80 (End sem) **+ 20** (In-sem)

Unit	Content	L	T	P	M	Hours
Unit 1: Newtonian Mechanics	1.1:Frames of Reference, Inertial Frames, Galilean Transformations, Galilean Invariance; Dynamics of a System of Particles, Centre of Mass, Principle of Conservation of Linear Momentum.	6	-	-	6	6
	1.2: The Work-Energy Theorem, Work done by conservative and non-conservative forces, Conservation of mechanical energy, Force as gradient of potential energy, Energy Diagram, Stable and Unstable Equilibrium	8	-	-	10	8
	1.3 Rotation about a fixed axis, Moment of Inertia, Calculation of Moment of Inertia for rectangular, cylindrical and spherical bodies, Angular momentum and its conservation,Kinetic Energy of Rotation, Motion involving both translation and rotation.	10	-	-	15	10
Unit 2: Properties of Matter	**2.1:** Relation between Elastic constants, Twisting torque on a Cylinder or Wire.	6	-	-	6	6
	2.2: Kinematics of Moving Fluids, Poiseuille's Equation for Flow of a Liquid through a Capillary Tube	5	-	-	3	5
Unit 3: Oscillations	Simple Harmonic Motion (SHM) and Oscillations, Differential Equation of SHM and its solution, Kinetic	10	-	-	15	10

	Energy, Potential Energy, Total energy and their time-average values, Damped oscillation, Forced oscillations, Resonance, Power Dissipation and Quality Factor.					
Unit 4: Special Theory of Relativity	Michelson-Morley Experiment and its outcome, Postulates of Special Theory of Relativity, Lorentz Transformations, Simultaneity and order of events, Lorentz contraction, Time dilation. Relativistic addition of Velocities, Variation of Mass with Velocity, Mass-energy Equivalence.	15	-	-	25	15
	Total	**60**	**-**	**-**	**80**	**60**

(L= Lecture, T= Tutorial, P= Practical, M= Marks)

Course title: Waves and Optics
Course code:PHYS-MI-2014

Nature of course:Minor

Total credits:4
Distribution of Marks: 80 (End sem) **+ 20** (In-sem)

Unit	Content	L	T	P	M	Hours
Unit 1: Superposition of Harmonic Oscillations	**1.1:** Linearity and Superposition Principle, Superposition of two collinear oscillations having equal frequencies and different frequencies (Beats), Superposition of N collinear Harmonic Oscillations with equal phase differences and equal frequency differences.	8	-	-	8	8
	1.2: Graphical and Analytical Methods, Lissajous Figures with equal and unequal frequencyand their use.	5	-	-	5	5
Unit 2: Wave Motion	**2.1:** Plane and Spherical Waves, Longitudinal and Transverse Waves, Plane Progressive (Travelling) Waves, Wave Equation, Particle and Wave Velocities, Differential Equation of a Wave, Pressure of a Longitudinal Wave, Energy Transport, Intensity of Wave,Wave packet,Phase and group velocity	4	-	-	4	4
	2.2: Velocity of Transverse Vibrations of Stretched	5	-	-	5	5

	Strings, Velocity of Longitudinal Waves in a Fluid in a Pipe, Newton's Formula for Velocity of Sound, Laplace's Correction.					
Unit 3: Harmonic Waves	Standing Waves in a String, Energy of Vibrating String, Transfer of Energy, Normal Modes of Stretched Strings, Plucked and Struck Strings, Melde's Experiment, Longitudinal Standing Waves and Normal Modes, Open and Closed Pipes, Superposition of N Harmonic Waves.	10	-	-	20	10
Unit 4: Wave optics	Electromagnetic nature of light, definition and properties of wave front, Huygens principle, Temporal and Spatial coherence	5	-	-	5	5
Unit 5: Interference	**5.1:** Division of amplitude and wavefront, Young's double slit experiment, Lloyd's Mirror and Fresnel's Biprism, Phase change on reflection: Stokes' treatment, Interference in Thin Films: parallel and wedge-shaped films. Newton's Rings: Measurement of wavelength and refractive index	14	-	-	24	14
	5.2: Michelson Interferometer- (i) Idea of form of fringes (No theory required), (ii) Determination of Wavelength, (iii) Wavelength Difference, (iv) Refractive Index and (v) Visibility of Fringes. Fabry-Perot interferometer.	9	-	-	9	9
	Total	**60**	-	-	**80**	**60**

(L=Lectures,T=Tutorial,P=Practical ,M=Marks)

Course Title-General Lab

Course coad:PHYS-MI-3014

Nature of course -Minor

Total credits:4

Distribution of Marks: 80 (End sem) **+ 20** (In-sem)

Unit	Content	L	T	P	M	Hours
	List of experiments					
Unit 1: Mechanics	(1) To determine the height of a building using a Sextant. (2) To study the Motion of Spring and calculate (a) Spring constant, (b) ***g*** and (c) Modulus of rigidity. (3) To determine the Moment of Inertia of a Flywheel. (4) To determine ***g*** and velocity for a freely falling body using Digital Timing Technique.	-	-	30	40	60

	(5) To determine Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille's method). (6) To determine the Young's Modulus of a Wire by Optical Lever Method. (7) To determine the Modulus of Rigidity of a Wire by Maxwell's needle. (8) To determine the elastic Constants of a wire by Searle's method. (9) To determine the value of ***g*** using Bar Pendulum. (10) To determine the value of ***g*** using Kater's Pendulum.					
Unit II: Waves and Optics	(1) To determine the frequency of an electric tuning fork by Melde's experiment and verify λ^2 –T law. (2) To determine the phase difference between two waves using Lissajous Figures. (3) To determine the refractive index of the Material of a prism using sodium source. (4) To determine the dispersive power and Cauchy constants of the material of a prism using mercury source. (5) To determine the wavelength of sodium source using Michelson's interferometer. (6) To determine wavelength of sodium light using Fresnel Biprism. (7) To determine wavelength of sodium light using Newton's Rings. (8) To determine the thickness of a thin paper by measuring the width of the interference fringes produced by a wedge-shaped Film. (9) To determine wavelength of (1) Na source and (2) spectral lines of Hg source using plane diffraction grating. (10) To determine dispersive power and resolving power of a plane diffraction grating.	-	-	30	40	60

	Total	**-**	**-**	**60**	**80**	**120**

(L= Lecture, T= Tutorial, P= Practical, M= Marks)

At least 60% of the experiments must be performed from each unit.

Mode of In-semester assessment:

1. Viva-voce: Marks 10
2. Attendance / Laboratory performance / Notebook: Marks 10 marks