SRM University – AP, Andhra Pradesh
Neerukonda, Mangalagiri Mandal
Guntur District, Mangalagiri, Andhra Pradesh 522240

Engineering Physics

Course Code	**FIC 102**	**Course Category**	FIC	**L-T-P-C**	2	0	1	3
Pre-Requisite Course(s)	NA	**Co-Requisite Course(s)**	NA	**Progressive Course(s)**	NA			
Course Offering Department	Physics	**Professional / Licensing Standards**						

Course Objectives

1. Objective 1: To understand the fundamental concepts of physics and their application in engineering.
2. Objective 2: To develop problem-solving skills through physics-based problems.
3. Objective 3: To enhance practical knowledge through laboratory experiments and real-world applications.
4. Objective 4: To foster analytical and critical thinking skills.

Course Outcome (COs)

CO's	At the end of the course the learner will be able to	Bloom's Level	Expected Proficiency Percentage	Expected Attainment Percentage
1	Demonstrate understanding of core physics principles in mechanics, waves, modern physics, and electromagnetism	2	**75**	**70**
2	Apply physics principles to analyse and solve engineering physics problems	3	**70**	**65**
3	Demonstrate problem-solving skills using mathematical tools	3	**70**	**65**
4	Evaluate experimental data to interpret and explain the underlying physics concepts	3	**75**	**70**

Course Articulation Matrix (CLO) to Program Learning Outcomes (PLO)

CLOs	**Program Learning Outcomes (PLO)**														
	Engineering Knowledge	**Problem Analysis**	**Design and Development**	**Analysis, Design and Research**	**Modern Tool and ICT Usage**	**Society and Multicultural Skills**	**Environment and Sustainability**	**Moral, and Ethical Awareness**	**Individual and Teamwork Skills**	**Communication Skills**	**Project Management and Finance**	**Self-Directed and Life Long Learning**	**PSO 1**	**PSO 2**	**PSO 3**
Outcome 1	2	2	1	1	1			1	2			2	1	1	1
Outcome 2	2	3	2	2	2			2	2			2	2	1	1
Outcome 3	2	3	2	2	2			2	2			2	2	1	1
Outcome 4	2	3	2	2	3			2	3			2	2	1	2
Course Average	**2.0**	**2.8**	**1.8**	**1.8**	**2.0**			**1.8**	**2.3**			**2.0**	**1.8**	**1.0**	**1.3**

Course Unitization Plan: Theory

Unit No.	Syllabus Topics	Required Contact Hours	CLOs Addressed	References Used
Unit No. 1	Introduction	1	1	1, 3
	Newton's laws of mechanics, Free body force diagram	1	1, 2, 3	1, 3
	Momentum and Impulse, Conservation of linear momentum	1	1, 2, 3	1, 3
	Work-Kinetic Energy Theorem and related problems	1	1, 2, 3	1, 3
	Conservation of mechanical energy: Worked outproblems	1	1, 2, 3	1, 3
	Elastic properties of solids, Stress-strain relationship, elastic constants, and their significance	1	1	1, 2
Unit No. 2	Concept of Electromagnetic waves & EMW Spectra	1	1	1, 2
	Geometrical & Wave Optics: Laws of reflection and refraction	1	1, 2, 3	1, 2
	Concept of Interference	1	1, 2, 3	1, 2
	Phase Difference and Path Difference	1	1	1, 2
	Double-Slit Interference	1	1	1, 2
	Diffraction: types and single slit	1	1, 2, 3	1, 2
Unit No. 3	Black Body Radiation; Wien's displacement law	1	1	1, 2
	Discussion on failure of classical laws to explain Black Body Radiation, and concept of Planck's Hypothesis	1	1, 2, 3	1, 2
	What is Light? Photon and Overview on Planck Constant	1	1	1, 2
	Photoelectric effect – Concept and Experimental Setup	1	1, 2, 3	1, 2
	Photoelectric effect – Intensity vs Current, Frequency vs Kinetic Energy, the drawback of Wave theory to explain Photoelectric effect	1	1	1, 2
	Wave properties of particle: De Broglie wave	1	1	1, 2
Unit No. 4	**Focus on Maxwell's Equation I**: Discuss lines of force and Electrostatic flux, Introduce Gauss's law (differential and integral form)	1	1	1, 4
	Application of Gauss Law: ES field due to infinite wire and sheet.	1	1	1, 4
	Electrostatic field due to conducting and insulating sphere.	1	1	1, 4
	Concept of Electrostatic Potential and Potential Energy. Inter-relation with electrostatic field.	1	1	1, 4
	Capacitor and Capacitance:	1	1, 2	1, 4
	Capacitance of a parallel plate capacitor.	1	1, 2, 3	1, 4
Unit No. 5	Introduce Biot-Savart Law as an alternative approach to calculate magnetic field.	1	1	1, 4
	Calculate Magnetic field due to finite current element using Biot Savart Law.	1	1	1, 4

	Focus on Maxwell's Equation IV: Discuss Ampere's circuital law.	1	1	1, 4
	Calculate Magnetic field due to Infinite wire and Solenoid using Ampere's Law.	1	1, 2, 3	1, 4
	Focus on Maxwell's Equation III: Lenz's Law and Faraday's law: Induced EMF and Current	1	1, 2, 3	1, 4
	Describe Maxwell Equations as the foundation of electro-magnetism. Derive differential forms starting from Integral forms. Discuss Physical Significance.	1	1	1, 4

Course Unitization Plan: Laboratory

Exp No.	Syllabus Topics	Required Contact Hours	CLOs Addressed	References Used
1	Hooke's law and determination of spring constant for a given spring	4	1, 4	5
2	Michelson interferometer kit with diode laser	4	1, 4	5
3	He-Ne laser kit: Optical Interference and Diffraction	4	1, 4	5
4	Diffraction by Grating and Particle size measurement	4	1, 4	5
5	Dielectric constant of air using dielectric constant kit.	4	1, 4	5
6	Verification of Stefan's Law	4	1, 4	5
7	Biot-savart law: To study the dependence of magnetic field on the current and magnetic field along the axis of a current carrying circular loop	4	1, 4	5
8	Faraday law & Induced E.M.F: Measurement of the induced voltage and calculation of the magnetic flux induced by a falling magnet	4	1, 4	5
9	Practice and model exam	8	1, 4	5

Learning Assessment

Bloom's Level of Cognitive Task		Continuous Learning Assessments (50 %)								End Semester Exam (50 %)	
		CLA-1 (15 %)		CLA-2 (15 %)		CLA-3 (__%)		Mid Term (20 %)			
		Th	Prac	Th	Prac	Th	Prac	Th	Prac	Th	Prac
Level 1	Remember	10%	5%	10%	5%			20%		10%	5%
	Understand	10%	5%	10%	5%			20%		10%	5%
Level 2	Apply	30%	10%	30%	10%			40%		30%	10%
	Analyse	10%	20%	10%	20%			20%		10%	20%
Level 3	Evaluate										
	Create										
Total		**60%**	**40%**	**60%**	**40%**			**100%**		**60%**	**40 %**

Recommended Resources

1. Serway, R. A., & Jewett, J. W. (2017). Physics for Scientists and Engineers with Modern Physics (9th ed.). Cengage India Private Limited.
2. Young, H. D., Freedman, R. A., & Ford, L. C. (2018). University Physics with Modern Physics with Mastering Physics (12th ed.). Pearson.

Recommended Online Resources

3. Massachusetts Institute of Technology: OpenCourseWare. (2023). Physics I: Classical Mechanics. Retrieved from Massachusetts Institute of Technology: MIT OpenCourseWare https://ocw.mit.edu/courses/physics/8-01x-classical-mechanics-fall-2023/
4. Massachusetts Institute of Technology: OpenCourseWare. (2023). Physics II: Electricity and Magnetism. Retrieved from Massachusetts Institute of Technology: MIT OpenCourseWare https://ocw.mit.edu/courses/physics/8-02x-electricity-and-magnetism-fall-2023/
5. Department of Physics, SRM University AP. Engineering Physics lab manuals. Retrieved from Engineering Physics Lab (FIC102) https://srmap.edu.in/seas/physics-teaching-lab/

Course Designers

a. *Dr. Jatis Kumar Dash, Associate Professor, Department of Physics, SRM University – AP, Andhra Pradesh.*
b. *Dr. Pranab Mandal, Associate Professor & Head. Dept. Of Physics. SRM University – AP, Andhra Pradesh.*
c. *Prof. M. S. Ramachandra Rao, Professor, Department of Physics, Indian Institute of Technology, Madras.*
d. *Prof. D. Narayana Rao, Raja Ramanna Fellow, University of Hyderabad, Hyderabad.*