SRM University – AP, Andhra Pradesh

Neerukonda, Mangalagiri Mandal
Guntur District, Mangalagiri, Andhra Pradesh 522240

FIC 102 Engineering Physics

Course Code	FIC102	**Course Category**	Core Course	**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**						
Board of Studies Approval Date		**Academic Council Approval Date**						

Course Objectives / Course Learning Rationales (CLRs)

Objective 1: To understand fundamental concepts of classical mechanics and elastic properties of solids.

Objective 2: To understand laws of Geometrical and Wave Optics and waves properties of light.

Objective 3: To learn fundamentals of Electromagnetism and Maxwell's equation as the foundation of Maxwell's Equation.

Objective 4: To familiarize about particle properties of waves and related fundamentals.

Course Outcomes / Course Learning Outcomes (CLOs)

	At the end of the course, the learner will be able to	**Bloom's Level**	**Expected Proficiency Percentage**	**Expected Attainment Percentage**
Outcome 1	Understanding fundamental concepts of classical mechanics	3	70%	65%
Outcome 2	Learning four Maxwell's Equations as foundation for Electromagnetism.	3	70%	65%
Outcome 3	Understanding Laws of Optics and waves properties of light	3	70%	65%
Outcome 4	Understanding particle properties of waves and related fundamentals	3	70%	65%

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

CLOs	Program Learning Outcomes (PLO)														
	Scientific and Disciplinary Knowledge	Analytical Reasoning and Problem Solving	Critical and Reflective Thinking	Scientific Reasoning and Design Thinking	Research Related Skills	Modern Tools and ICT Usage	Environment and Sustainability	Moral, Multicultural and Ethical Awareness	Individual and Teamwork Skills	Communication Skills	Leadership Readiness Skills	Self-Directed and Life Long Learning	PSO 1	PSO 2	PSO 3
Outcome 1	3	3	3	2	1				2			2	3	1	2
Outcome 2	3	3	3	3	2				2			2	3	2	2
Outcome 3	3	3	3	3	2				2			2	3	2	2
Outcome 4	3	3	3	3	2				3			2	3	2	2
Outcome 5	3	3	3	3	3				2			3	3	2	2
Course Average	**3**	**3**	**3**	**3**	**3**				**2**			**2**	**3**	**2**	**2**

Course Unitization Plan

Unit No.	Unit Name	Required Contact Hours	CLOs Addressed	References
Unit 1	**CLASSICAL PHYSICS**	**6**		
1.	Introduction	1	1	1, 2
2.	Newton's laws of mechanics, Free body force diagram	1	1	1, 2
3.	Momentum and Impulse, Conservation of linear momentum	1	1	1, 2
4.	Work-Kinetic Energy Theorem and related problems	1	1	1,2
5.	Conservation of mechanical energy: Worked out problems	1	1	1, 2
6.	Elastic properties of solids, Stress-strain relationship, elastic constants, and their significance	1	1	1, 2
Unit 2	**OPTICS**	**6**		
7.	Concept of Electromagnetic waves & EMW Spectra	1	3	1,2, 5
8.	Geometrical & Wave Optics: Laws of reflection and refraction	1	3	1,2, 5
9.	Concept of Interference	1	3	1,2, 5
10.	Phase Difference and Path Difference	1	3	1,2, 5

11.	Double-Slit Interference	1	3	1,2, 5
12.	Diffraction: types and single slit	1	3	1,2, 5
Unit 3	**MODERN PHYSICS**	**6**		
13.	Black Body Radiation; Wien's displacement law	1	4	1,2,3
14.	Discussion on failure of classical laws to explain Black Body Radiation, and concept of Planck's Hypothesis	1	4	1,2,3
15.	What is Light? Photon and Overview on Planck Constant	1	4	1,2,3
16.	Photoelectric effect – Concept and Experimental Setup	1	4	1,2,3
17.	Photoelectric effect – Intensity vs Current, Frequency vs Kinetic Energy, the drawback of Wave theory to explain Photoelectric effect	1	4	1,2,3
18.	Wave properties of particle: De Broglie wave	1	4	1,2,3
Unit 4	**ELECTRO-MAGNETISM – I**	**6**		
19.	**Focus on Maxwell's Equation I**: Discuss lines of force and Electrostatic flux, Introduce Gauss's law (differential and integral form)	1	2	1, 2, 4
20.	Application of Gauss Law: ES field due to infinite wire and sheet.	1	2	1, 2, 4
21.	Electrostatic field due to conducting and insulating sphere.	1	2	1, 2, 4
22.	Concept of Electrostatic Potential and Potential Energy. Inter-relation with electrostatic field.	1	2	1, 2, 4
23.	Capacitor and Capacitance:	1	2	1, 2, 4
24.	Capacitance of a parallel plate capacitor.	1	2	1, 2, 4
Unit 5	**ELECTRO-MAGNETISM - II**	**6**		
25.	Introduce Biot-Savart Law as an alternative approach to calculate magnetic field.	1	2	1, 2, 4
26.	Calculate Magnetic field due to finite current element using Biot Savart Law.	1	2	1, 2, 4
27.	Focus on Maxwell's Equation IV: Discuss Ampere's circuital law.	1	2	1, 2, 4
28.	Calculate Magnetic field due to Infinite wire and Solenoid using Ampere's Law.	1	2	1, 2, 4
29.	Focus on Maxwell's Equation III: Lenz's Law and Faraday's law: Induced EMF and Current	1	2	1, 2, 4
30.	Describe Maxwell Equations as the foundation of electro-magnetism. Derive differential forms starting from Integral forms. Discuss Physical Significance.	1	2	1, 2, 4
TOTAL CONTACT HOURS		**30**		

List of Experiments

- Hooke's law and determine spring constant for a given spring
- Faraday law & Induced E.M.F: Measurement of the induced voltage and calculation of the magnetic flux induced by a falling magnet
- 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
- Dielectric constant of air using dielectric constant kit.
- Michelson interferometer kit with diode laser
- He-Ne laser kit: Optical Interference and Diffraction
- Diffraction by Grating and Particle size measurement
- Verification of Stefan's Law

Recommended Resources

1. University Physics with Modern Physics with Mastering Physics - D Young, Roger A Freedman And Lewis Ford, XII Edition (2018), Publisher – PEARSON
2. Physics for Scientist and Engineers - Raymond A. Serway, John W. Jewett, XIX Edition (2017), Publisher - Cengage India Private Limited
3. Concept of Modern Physics - Arthur Beiser, Shobhit Mahajan, S Rai, 2017 Edition, Publisher - Tata McGraw Hill

Other Sources

1. Introduction to Electrodynamics – David J. Griffiths. 4th Edition (2012), Publisher - PHI Eastern Economy Editions
2. Electricity and Magnetism - A S Mahajan and A A Rangwala, Revised of 1 Edition (2001), Publisher - McGraw-Hill
3. Advanced Engineering Mathematics - Erwin Kreyszig, X Edition (2016), Publisher - Wiley

Learning Assessment

a.) Continuous Evaluation

	Assessment tool	Conducting Marks	Converting Marks	Final Conversion
Theory + Practical	**Mid-term**	25	20	**50**
	CLA-I Class test(30%) , Poll/Quiz (15%), Assignments (15%), lab performance (15%), model exam (15%), observation note (10%),	15	15	
	CLA-II Class test(30%) , Poll/Quiz (15%), Assignments (15%), lab performance (15%), model exam (15%), observation note (10%),	15	15	
			Total	**50**

b.) End Semester

	Assessment tool	Conducting Marks	Final Conversion
End semester theory exam	Final exam	100	**30**
End semester Practical exam	Exam performance (60%)	100	**20**
	Practical record (20%)		
	Viva (20%)		
		Total	**50**

Total Marks = (a) + (b) = 100

Course Designers

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