Subject Code	Subject Name	Teaching Scheme			Credits Assigned			
		Theory	Practical	Tutorial	Theory	Term Work/ Practical	Tutorial	Total
FEC202	**Applied Physics-II**	03	01	-	03	0.5	-	3.5

Subject Code	Subject Name	Examination Scheme							
		Theory				Term Work	Practical	Oral	Total
		Internal Assessment			End SEM. Exam.				
		Test 1	Test 2	Average of Test 1 & 2					
FEC202	**Applied Physics-II**	15	15	15	60	25	-	-	100

COURSE OBJECTIVES

Identify and understand the fundamental physical principals underlying engineering devices and processes—a prerequisite to become successful engineers.

To provide inclusive knowledge of fundamental physical principles encouraging engineering students to venture into the research field.

COURSE OUTCOME

1) Ability to demonstrate competency & understanding of basic concepts of Physics like - Optics, Lasers, Fibre optics, Electrodynamics, Nanotechnology, etc.

2) Comprehend the concepts of interference and diffraction and their applications

3) Apply the working principles of Optical fibre, LASER and their applications in emerging technology

4) Understand electrodynamics, Maxwell's equations and their applications

5) Assimilate knowledge of the Nanotechnology and tools used SEM, TEM, AFM

Module 1	**INTERFERENCE AND DIFFRACTION OF LIGHT** Interference by division of amplitude and by division of wavefront; Interference in thin film of constant thickness due to reflected and transmitted light; origin of colours in thin film; Wedge shaped film(angle of wedge and thickness measurement); Newton's rings Applications of interference - Determination of thickness of very thin wire or foil; determination of refractive index of liquid; wavelength of incident light; radius of curvature of lens; testing of surface flatness; Anti-reflecting films and Highly reflecting film. Diffraction of Light –Fraunhoffer diffraction at single slit, Fraunhoffer diffraction at	**14 hrs**

	double slit, Diffraction Grating, Resolving power of a grating, dispersive power of a grating Application of Diffraction - Determination of wavelength of light with a plane transmission grating	
Module 2	**LASERS** Quantum processes as absorption, spontaneous emission and stimulated emission; metastablestates, population inversion, pumping, resonance cavity, Einsteins's equations; Helium Neon laser; Nd:YAG laser; Semiconductor laser, Applications of laser- Holography (construction and reconstruction of holograms) and industrial applications(cutting, welding etc), Applications in medical field	**04hrs**
Module 3	**FIBRE OPTICS** Total internal reflection; Numerical Aperture; critical angle; angle of acceptance; Vnumber; number of modes of propagation; types of optical fiber; Losses in optical fibre(Attenuation and dispersion) Applications of optical fibre - Fibre optic communication system; sensors (Pressure, temperature, smoke, water level), applications in medical field	**04 hrs**
Module 4	**ELECTRODYNAMICS** Cartesian, Cylindrical and Spherical Coordinate system, Scaler and Vector field, Physical significance of gradient, curl and divergence, Determination of Maxwell's four equations. Applications-design of antenna, wave guide, satellite communication etc.	**08 hrs**
Module 5	**CHARGE PARTICLE IN ELECTRIC AND MAGNETIC FIELDS** Fundamentals of Electromagnetism, Motion of electron in electric field (parallel ,perpendicular, with some angle); Motion of electron in magnetic field (Longitudinal and Transverse); Magnetic deflection; Motion of electron in crossed field; Velocity Selector; Velocity Filter, Electron refraction; Bethe's law; Electrostatic focusing; Magnetostatic focusing; Cathode ray tube (CRT);Cathod ray Oscilloscope (CRO) Application of CRO: Voltage (dc,ac), frequency, phase measurement.	**05 hrs**
Module 6	**NANOSCIENCE AND NANOTECHNOLOGY** Introduction to nano-science and nanotechnology, Surface to volume ratio, Two main approaches in nanotechnology -Bottom up technique and top down technique; Important tools in nanotechnology such as Scanning Electron Microscope, Transmission Electron Microscope, Atomic Force Microscope. Nano materials: Methods to synthesize nanomaterials (Ball milling, Sputtering, Vapour deposition, solgel), properties and applications of nanomaterials.	**04 hrs**

Books Recommended:

1. A text book of Engineering Physics-Avadhanulu & Kshirsagar, S.Chand
2. Fundamentals of Optics by Jenkins and White, McGraw-Hill
3. Optics - Ajay Ghatak, Tata McGraw Hill
4. Concepts of Modern Physics- ArtherBeiser, Tata Mcgraw Hill
5. A textbook of Optics - N. Subramanyam and Brijlal, S.Chand
6. Engineering Physics-D. K. Bhattacharya, Oxford
7. Concepts of Modern Physics- ArtherBeiser, Tata Mcgraw Hill
8. Classical Electodyamics – J. D. Jackson, Wiley

9. Introduction to Electrodynamics- D. J. Griffiths, Pearson publication
10. Intoduction to Nanotechnology- Charles P. Poole, Jr., Frank J. Owens, Wiley India edition
11. Nano: The Essential – T. Pradeep, Mcgraw-Hill Education

Suggested Experiments: (Any five)

1. Determination of radius of curvature of a lens using Newton's ring set up
2. Determination of diameter of wire/hair or thickness of paper using Wedge shape film method.
3. Determination of wavelength using Diffracion grating. (Hg/ Ne source)
4. Determination of number of lines on the grating surface using LASER Sourse.
5. Determination of Numerical Aperture of an optical fibre.
6. Determination of wavelength using Diffracion grating. (Laser source)
7. Use of CRO for measurement of frequency and amplitude.
8. Use of CRO for measurement of phase angle.
9. Study of divergence of laser beam
10. Determination of width of a slit using single slit diffraction experiment (laser source)

Note: Distribution of marks for term work

1. Laboratory work (Experiments and Journal) : 10 marks
2. Two Assignments: 10 marks
2. Attendance (Practical): 05marks

Theory Examination:

1. Question paper will comprise of 6 questions, each carrying 15 marks.
2. Total 4 questions need to be solved.
3: Q.1 will be compulsory, based on entire syllabus wherein sub questions of 2 to 3 marks will be asked.
4: Remaining question will be randomly selected from all the modules.
5: Weightage of marks should be proportional to number of hours assigned to each