

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	TW/Pract	Tut.	Total
FEC202	Applied Physics – II	03	01	--	03	0.5	--	3.5

Course Code	Course Name	Examination Scheme							
		Theory				Term Work	Pract	Oral	Total
		Internal Assessment			End Sem Exam				
		Test1	Test2	Av of Test 1 & 2					
FEC202	Applied Physics – II	15	15	15	60	25	--	--	100

Objectives

1. To impart knowledge of basic concepts in applied physics.
2. To provide the knowledge and methodology necessary for solving problems in the field of engineering.

Outcomes: Learner will be able to...

1. Comprehend principles of interference and diffraction.
2. Illustrate the principle, construction and working of various LASERs and its applications.
3. Identify various applications of optical fibres.
4. Comprehend the concepts of electrodynamics and Maxwell's equations and their use in telecommunication systems.
5. Apply the concepts of electromagnetism in focusing systems and CRO.
6. Comprehend the significance of nanoscience and nanotechnology, its applications.

Module	Detailed Contents	Hrs.
01	INTERFERENCE AND DIFFRACTION OF LIGHT Interference by division of amplitude and by division of wave front; 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 – Fraunhofer diffraction at single slit, Fraunhofer diffraction at 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	14
02	LASERS Quantum processes as absorption, spontaneous emission and stimulated emission; metastable states, population inversion, pumping, resonance cavity, Einstein'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	04
03	FIBRE OPTICS Total internal reflection; Numerical Aperture; critical angle; angle of acceptance; V number; 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

04	ELECTRODYNAMICS Cartesian, Cylindrical and Spherical Coordinate system, Scalar 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
05	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); Cathode ray Oscilloscope (CRO) Application of CRO: Voltage (dc,ac), frequency, phase measurement.	05
06	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

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 Diffraction grating. (Hg/ Ne source)
4. Determination of number of lines on the grating surface using LASER Source.
5. Determination of Numerical Aperture of an optical fibre.
6. Determination of wavelength using Diffraction 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)

The distribution of Term Work marks will be as follows –

4. Attendance (Theory and Practical) : 05 marks
5. Assignments : 10 marks
6. Laboratory work (Experiments and Journal) : 10 marks

Assessment:

Internal Assessment Test:

Assessment consists of two class tests of 15 marks each. The first class test is to be conducted when approx. 40% syllabus is completed and second class test when additional 35% syllabus is completed. Duration of each test shall be one hour.

End Semester Theory Examination:

1. Question paper will comprise of total 06 questions, each carrying 15 marks.
2. Total 04 questions need to be solved.
3. Question No: 01 will be compulsory and based on entire syllabus wherein sub-questions of 2 to 3 marks will be asked.
4. Remaining questions will be mixed in nature. (e.g. Suppose Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
5. In question paper weightage of each module will be proportional to number of respective lecture hrs as mentioned in the syllabus.

References:

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