Department of Humanities & Science

F.E. (Common to all Branches) (semester II)

Course Outcomes & Assessment Plan

Subject: Applied Physics II

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.

1. Syllabus of Applied Physics II

Module	Detailed Contents	Hrs.
01	**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 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, 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	**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); Cathod 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 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)

The distribution of Term Work marks will be as follows –

1. Attendance (Theory and Practical) : 05 marks
2. Assignments : 10 marks
3. 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 3marks 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 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

2. CO Statements.

Course Outcomes: Learner will be able to…

1. Apply the principles of interference and diffraction to find conditions for maxima & minima intensities.
2. Explain the principle,construction and working of various LASERs and its applications.
3. Explain the concepts of optical fibers and their applications.
4. Explain the basic principles of electrodynamics and derive Maxwell's equations.
5. Explain the concepts of electrostatic and magnetic focusing systems and CRO.
6. Explain the basic instruments used for the study of nanotechnology.

3. CO-PO Mapping

CO	PO1
FEC202.1	HI
FEC202.2	HI
FEC202.3	HI
FEC202.4	HI
FEC202.5	HI
FEC202.6	HI

4. CO Assessment Tools:

	Tool for Direct Attainment				Indirect tool
CO	**Class Test**	**Assignment**	**Practical performance**	**Semester End Exam**	**Course Exit Survey**
FEC202.1	T 1- 20%	A1-20%	10%	50%	100%
FEC202.2	T2-20%	A1-20%	10%	50%	100%
FEC202.3	T2-20%	A1-20%	10%	50%	100%
FEC202.4	T2-30%	A2-20%	----	50%	100%
FEC202.5	T2-30%	A2-20%	----	50%	100%
FEC202.6		A2-20%	----	50%	100%
Target	60% of students will score above 60% marks	60% of students will score above 60% marks	60% of students will score above 60% marks	60% of students will score above 40% marks	60% of students will score above 60%

Rubrics for Assessment

Assignment :

Assignments will be given to the students and graded as per the following rubrics.

Rubrics for Assignment Grading:

Indicator	Poor	Average	Good	Excellent
Punctuality (3)	More than two session late (0)	Two sessions late (1)	One session late (2)	Early or on time (3)
Presentation (3)	Very poor readability and not structured (0)	Poor readability and somewhat structured (1)	Readable with one or two mistakes and structured (2)	Very well written and structured without any mistakes (3)
Content and coverage (4)	Major points are omitted or addressed minimally (1)	All major topics are covered, the information is accurate.(2)	Most major and some minor criteria are included. Information is Accurate (3)	All major and minor criteria are covered and are accurate. (4)

Practical

Five practical will be conducted as per schedule.

Rubrics for practical Grading:

Indicator	Poor	Average	Good
Punctuality(2)	Two sessions late(0)	One session late (1)	In time submission(2)
Preparedness (2)	No idea about experiment(0)	Read the manual and have some idea(1)	Read Manual and know the procedure(2)
Participation (3)	No involvement(1)	Passive involvement(2)	Active involvement(3)
Presentation(3)	Poor readability and somewhat structured (1)	Readable with one or two mistakes and structured (2)	Very well written and structured without any mistakes (3)

Lesson Plans

Fr. Conceicao Rodrigues College of Engineering, Bandra (West), Mumbai-400 050

Subject: Applied Physics- II					
Name of Faculty: Dileep Chandra. C			**Academic Year: 2018-19**		
Branch: Production Engineering			**Semester: II**		
No of Lectures	**Sr. No.**	**Name of the Topic**	**Planned Date**	**Executed Date**	**Remark**
Module 1 Interference and Diffraction					
1	1	Interference in thin films- basic ideas	1/1/2019	4/1/2019	
2	2	Thin uniform film-interference in reflected &transmitted light.	2/1/2019	7/1/2019	
3	3	Wedge shaped film	4/1/2019	9/1/2019	
4	4	Newton's rings.	7/1/2019	10/1/2019	
5	5	Applications of interference	8/1/2019	11/1/2019	
6	6	Numericals Problems	9/1/2019	15/1/2019	
7	7	Diffraction of light – Basic principles	11/1/2019	16/1/2019	
8	8	Diffraction at single slit.	15/1/2019	17/1/2019	
9	9	Diffraction at double slit	17/1/2019	18/1/2019	
10	10	Diffraction at multiple slit – diffraction Grating.	18/1/2019	22/1/2019	
11	11	Numericals Problems	22/1/2019	24/1/2019	
12	12	Applications and parameters of grating.	24/1/2019	25/1/2019	
Module 2 Lasers:					
13	1	Absorption and emission as quantum processes, Metastable states, population inversion and pumping.	25/1/2019	29/1/2019	
14	2	Einstein's Coefficients – derivation, He-Ne laser.	29/1/2019	31/1/2019	
15	3	Nd-YAG laser and semiconductor laser	31/1/2019	1/2/2019	
16	4	Applications of laser-Holography	1/2/209	7/2/2019	
Module 3 Fiber optics					
17	1	Basics of optical fiber transmission.	7/2/2019	8/2/2019	
18	2	Numerical aperture and acceptance angle.	8/2/2019	8/2/2019	
19	3	V-number and number of Modes	21/2/2019	21/2/2019	
20	3	Losses in fiber and applications of optical fiber, Numericals	22/2/2019	22/2/2019	
Modile 4 Electrodynamics					
21	1	Cartesian, Cylindrical and Spherical Coordinate system,	26/2/2019	26/2/2019	
22	2	Scaler and Vector field,	28/2/2019	28/2/2019	
23	3	Physical significance of gradient, curl and divergence,	1/3/2019	1/3/2019	
24	4	Numerical problems	5/3/2019	5/3/2019	
25	5	Derivation of Maxwell's four equations.	7/3/2019	7/3/2019	
26	6	Applications-design of antenna,	8/3/2019	8/3/2019	
27	7	Wave guide,	12/3/2019	12/3/2019	

28	8	Satellite communication etc.	19/3/2019	19/3/2019	
Module 5 Electron optics					
29	1	Electrostatic focusing.	21/3/2019	21/3/2019	
30	2	Magneto static focusing.	22/3/2019	22/3/2019	
31	3	Cathode ray tube.	26/3/2019	26/3/2019	
32	4	Cathode Ray Oscilloscope (CRO), Applications of CRO	28/3/2019	28/3/2019	
Module 6 Nanotechnology					
33	1	Introduction to nano, Two main approaches in nano technology.	29/3/2019	29/3/2019	
34	2	Tools used in nano technology- SEM, STM & AFM	2/4/2019	2/4/2019	
35	3	Nano materials: Methods to synthesize nanomaterials (Ball milling, Sputtering, Vapour deposition, solgel), properties and applications of nanomaterials.	4/4/2019	4/4/2019	

Fr. Conceicao Rodrigues College of Engineering, Bandra (West), Mumbai-400 050

Subject: Applied Physics- II					
Name of Faculty: Dileep Chandra. C			**Academic Year: 2018-19**		
Branch:Information Technology			**Semester: II**		
No of Lectures	**Sr. No.**	**Name of the Topic**	**Planned Date**	**Executed Date**	**Remark**
Module 1 Interference and Diffraction					
1	1	Interference in thin films- basic ideas	1/1/2019	2/1/2019	
2	2	Thin uniform film-interference in reflected &transmitted light.	2/1/2019	3/1/2019	
3	3	Wedge shaped film	3/1/2019	7/1/2019	
4	4	Newton's rings.	4/1/2019	8/1/2019	
5	5	Applications of interference	7/1/2019	9/1/2019	
6	6	Numericals Problems	8/1/2019	10/1/2019	
7	7	Diffraction of light – Basic principles	9/1/2019	14/1/2019	
8	8	Diffraction at single slit.	10/1/2019	15/1/2019	
9	9	Diffraction at double slit	10/1/2019	16/1/2019	
10	10	Diffraction at multiple slit – diffraction Grating.	15/1/2019	21/1/2019	
11	11	Numericals Problems	16/1/2019	22/1/2019	
12	12	Applications and parameters of grating.	21/1/2019	23/1/2019	
Module 2 Lasers:					
13	1	Absorption and emission as quantum processes, Metastable states, population inversion and pumping.	22/1/2019	28/1/2019	
14	2	Einstein's Coefficients – derivation, He-Ne laser.	23/1/2019	29/1/2019	
15	3	Nd-YAG laser and semiconductor laser	28/1/2019	30/1/2019	
16	4	Applications of laser-Holography	29/1/2019	18/2/2019	
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19	3	V-number and number of Modes	19/2/2019	26/2/2019	
20	3	Losses in fiber and applications of optical fiber, Numericals	20/2/2019	26/2/2019	
Modile 4 Electrodynamics					
21	1	Cartesian, Cylindrical and Spherical Coordinate system,	25/2/2019	27/2/2019	
22	2	Scaler and Vector field,	26/2/2019	5/3/2019	
23	3	Physical significance of gradient, curl and divergence,	27/2/2019	6/3/2019	
24	4	Numerical problems	5/3/2019	11/3/2019	
25	5	Derivation of Maxwell's four equations.	6/3/2019	12/3/2019	
26	6	Applications-design of antenna,	11/3/2019	13/3/2019	
27	7	Wave guide,	18/3/2019	18/3/2019	
28	8	Satellite communication etc.	19/3/2019	19/3/2019	
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31	3	Cathode ray tube.	26/3/2019	2/4/2019	
32	4	Cathode Ray Oscilloscope (CRO), Applications of CRO	27/3/2019	3/4/2019	
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33	1	Introduction to nano, Two main approaches in nano technology.	1/4/2019		
34	2	Tools used in nano technology- SEM, STM & AFM	2/4/2019		
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