

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

Course Title	Physics - I		
Course Code	PHIR11	No. of Credits	3 (2 credit theory+1 credit lab)
Department	Physics	Faculty	Dr. R. Justin Joseyphus
Pre-requisites Course Code	Nil		
Course Coordinator(s) (if, applicable)	Dr. N. V. Giridharan Dr. S. Manivannan		
Other Course Teacher(s)/Tutor(s) E-mail	rjustinj@nitt.edu	Telephone No.	3610
Course Type	<input type="checkbox"/> X Core course	<input type="checkbox"/>	Elective course
COURSE OVERVIEW			
The Physics- I course is offered in the first semester to all the branches of engineering. The subject has 2 credit theory and 1 credit lab weightage.			
COURSE OBJECTIVES			
<ul style="list-style-type: none"> • To make a bridge between the Physics in school and engineering courses. • To introduce the basic concepts of modern science like Photonics, • Engineering applications of acoustics, fundamentals of crystal physics and materials science. 			
COURSE OUTCOMES (CO)			
Course Outcomes	Aligned Programme Outcomes (PO)		
The student will be able to 1. Understand many modern devices and technologies based on lasers and optical fibers. 2. Appreciate various material properties which are used in engineering applications and devices. 3. Identify the cause of reverberations in buildings 4. Analyze the crystal structure of materials 5. Decide on suitable materials for engineering applications	<ul style="list-style-type: none"> ➤ Obtain indepth knowledge on important Physics concepts ➤ Carry out independent research work in interdisciplinary areas ➤ Interact with professionals in related areas 		

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➤ Communicate ideas and learn new technologies

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Tentative Week	Topic	Mode of Delivery
1.	First 3 weeks	LASERS Introduction to Laser-characteristics of Lasers-Spontaneous and stimulated emissions –Einstein's coefficients – population inversion and lasing action –laser systems: Ruby laser, He-Ne Laser, semiconductor laser-applications:–Holography-CD-drive – industrial and medical applications.	Lectures and discussions
2.	3-6 th week	FIBER OPTICS Fermat's principle and Snell's law-optical fiber –principle and construction –acceptance cone - numerical aperture –V-Number -types of fibers, Fabrication: Double C rucible Technique, Vapour phase Oxidation Process –fiber optic communication principle –fiber optic sensors-other applications of optical fibers	Lectures and discussions.
3.	6-9 th week	ACOUSTICS Characteristics of musical sound – loudness –Weber-Fechner law –decibel –absorption coefficient –reverberation –reverberation time –Sabine's formula – acoustics of buildings –ultrasonics –production of ultrasonics using piezoelectric method – magnetostriction method-applications	Lectures and discussions
4.	9-12 th week	CRYSTALLOGRAPHY Crystalline and amorphous solids – lattice and unit cell –seven crystal system and Bravais lattices –symmetry operation –Miller indices –atomic radius –coordination number –packing factor calculation for sc, bcc, fcc –Bragg's law of X-ray diffraction – Laue Method-powder crystal method.	Lectures, presentation/seminars

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5.	12-15 th week	MAGNETIC MATERIALS, CONDUCTORS AND SUPERCONDUCTORS Magnetic materials: Definition of terms –classification of magnetic materials and properties –domain theory of ferromagnetism-hard and soft magnetic materials –applications. Conductors: classical free electron theory (Lorentz –Drude theory) –electrical conductivity; Superconductors: definition –Meissner effect –type I & II superconductors –BCS theory (qualitative) –high temperature superconductors –Josephson effect – quantum interference (qualitative) – SQUID –applications.		Lectures, power point/ discussion
COURSE ASSESSMENT METHODS				
S.No.	Mode of Assessment	Tentative Week/Date	Duration	% Weightage
1.	Assessment-I (Quiz- I)	4 th week (Topic: Lasers)	30 min	10 %
2.	Assessment -II (Mid semester exam)	10 th week (Topics upto acoustics)	90 min	30 %
4.	Assessment- III (Quiz – II/Seminar)	13 th week (Topic: Crystallography)	30 min	10 %
5.	Final Assessment- IV (Semester exam)	December 2017 (All topics)	180 min	50 %
	Theory	Total		100 %
6.	Practicals Demonstration I	1 st week	3 h	Nil
7.	Practicals Demonstration II	2 nd week	3 h	Nil
8	Practicals Assessment I	3 rd week	3 h	20 %

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9	Practicals Assessment II	4 th week	3 h	20 %
10.	Practicals Assessment III	5 th week	3 h	20 %
11.	Practicals Assessment IV	6 th week	3 h	20 %
12.	Practicals Assessment V	7 th week	3 h	20 %
	Practicals		Total	100%
	Each lab session carries equal weightage			
	Theory weightage: 2/3 Practicals weightage : 1/3			
ESSENTIAL READINGS : Textbooks, reference books Website addresses, journals, etc				
<ol style="list-style-type: none"> 1. <i>A text book of Engineering Physics, M.N. Avadhanulu and P.G. Kshirsagar, S. Chand and Company, New Delhi (2009).</i> 2. <i>Engineering Physics, R.K. Gaur and S.L. Gupta, Dhanpat Rai Publications (P) Ltd., 8th edn., New Delhi (2001).</i> 3. <i>Laser Fundamentals, William T. Silfvast, 2nd edn, Cambridge University press, New York (2004)</i> 4. <i>Fundamentals of Physics, 6th Edition, D. Halliday, R. Resnick and J. Walker, John Wiley and Sons, New York (2001).</i> 5. <i>Introduction to Solid State Physics, 7th Edn, Charles Kittel, Wiley, Delhi (2007).</i> 				

COURSE EXIT SURVEY (mention the ways in which the feedback about the course is assessed and indicate the attainment also)
<ul style="list-style-type: none"> ➤ Questionnaire about the effectiveness of the delivery method, topics and the knowledge gained
COURSE POLICY (including plagiarism, academic honesty, attendance, etc.)
<ul style="list-style-type: none"> ➤ 75 % attendance is mandatory including exemptions due to ill health/on-duty/unavoidable circumstances. ➤ Those who indulge in malpractice such as copying, plagiarism shall be awarded zero marks for that assessment. ➤ Those who are absent for any of the assessments (I-III) on genuine grounds shall be given an opportunity only once for the reassessment with the prior permission of the concerned faculty member and Head of Physics Department.

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The reassessment shall be conducted before the semester exam and the portions will be lasers, fiber optics, acoustics and crystallography.

- The marks for laboratory assessments shall be awarded based on independent experiments, observation, accuracy, etc.
- The pass mark shall be 35% or half of class average whichever is higher.
- The total marks will be for 100 % including the theory and lab put together.
- Any misbehavior, indiscipline in the classroom/laboratory/exam hall will be dealt with seriously. In the worst case, the institute disciplinary committee is empowered to debar the student from the course.
- Those who fail in the final assessment has to appear for reassessment in the subsequent session on registration for the same.

ADDITIONAL COURSE INFORMATION

The teachers can be contacted through phone or in person for clarifications by the student on a mutually convenient time.

FOR SENATE'S CONSIDERATION

Course Faculty

R. John Joseph
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HOD

Dr. Rajan

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