

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE OUTLINE TEMPLATE			
Course Title	Physics - I	Offered to:	I B.Tech (Production-B Sec)
Course Code	PHIR 11	No. of Credits	3 (2 credit theory+1 credit lab)
Department	Physics	Faculty	Dr. J. Hemalatha
Pre-requisites Course Code	Nil		
Course Coordinator(s) (if, applicable)	Dr.S. Manivannan Dr.N.V. Giridharan		
Other Course Teacher(s)/Tutor(s)) E-mail	Details are available with first year coordinator office	Telephone No.	2503608
Course Type	<input type="checkbox"/> X Core course	<input type="checkbox"/>	Elective course
COURSE OVERVIEW			
The course “Physics- I” 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 ▪ Communicate ideas and learn new technologies 	

COURSE TEACHING AND LEARNING ACTIVITIES			
S.No.	Week	Topic	Mode of Delivery
1.	First 2-3 weeks	<p>Lasers</p> <p>Introduction - characteristics - 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.</p>	Lectures, class room discussions and power point presentations.
2.	Next 2-3 weeks	<p>Fiber Optics</p> <p>Fermat’s principle and Snell’s law, optical fiber – principle and construction – acceptance cone -numerical aperture – V-Number -types of fibers, Fabrication: Double Crucible Technique, Vapour phase Oxidation Process –fiber optic communication principle –fiber optic sensors-other applications of optical fibers.</p>	Lectures, class room discussions and power point presentations.
3.	Next 2-3 weeks	<p>Acoustics</p> <p>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.</p>	Lectures, class room discussions and power point presentations.
4.	Next 2-3 weeks	<p>Crystallography</p> <p>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.</p>	Lectures, class room discussions and power point presentations.

5.	Next 2-3 weeks	<p>Magnetic materials, conductors and superconductors</p> <p>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 – electrical conductivity, Superconductors: definition –Meissner effect –type I & II superconductors – BCS theory (qualitative) – high temperature superconductors – Josephson effect – quantum interference (qualitative) – SQUID –applications.</p>	Lectures, class room discussions and power point presentations.	
COURSE ASSESSMENT METHODS				
S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1.	Quiz- I	Week -4 (Lasers)	30 min	10 %
2.	Mid semester exam	Week – 10 (Lasers, Fiber Optics, Acoustics)	90 min	30 %
3.	Quiz – II	Week – 12 (Crystallography)	30 min	10 %
4.	Semester exam	11.12.2017 - 22.12.2017 (Entire Syllabus)	180 min	50 %
		Total (theory)		100 %
5.	Practicals	Week -1 (Demonstration)	3 hr	Nil
		Week -2 (Demonstration)	3 hr	Nil
		Week – 3 (Experiment – 1)	3 hr	20%
		Week – 4 (Experiment -2)	3 hr	20%
		Week – 5 (Experiment – 3)	3 hr	20%
		Week – 6 (Experiment -4)	3 hr	20%
		Week – 7 (Experiment -5)	3 hr	20%
			Total (Practicals)	

	No separate semester exam for laboratory Theory weightage: 2/3 Practicals weightage : 1/3
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ESSENTIAL READINGS :

1. A text book of Engineering Physics, M.N. Avadhanulu and P.G. Kshirsagar, S. Chand and Company, New Delhi (2009).
2. Engineering Physics, R.K. Gaur and S.L. Gupta, Dhanpat Rai Publications (P) Ltd., 8th edn., New Delhi (2001).
3. Laser Fundamentals, William T. Silfvast, 2nd edn, Cambridge University press, New York (2004)
4. Fundamentals of Physics, 6th Edition, D. Halliday, R. Resnick and J. Walker, John Wiley and Sons, New York (2001).
5. Introduction to Solid State Physics, 7th Edn, Charles Kittel, Wiley, Delhi (2007).

COURSE EXIT SURVEY

- Performance in the assessment methods
- Questionnaire about the effectiveness of the delivery method, topics and the knowledge gained

COURSE POLICY (including plagiarism, academic honesty, attendance, etc.)

- 75 % attendance is mandatory. The students with less than 75% of attendance will be prevented from writing the semester exam and will have to redo the course.
- Those who are absent for any of the assessment tests, on genuine grounds, shall be given an opportunity only once for the retest with the prior permission of the concerned faculty member and Head of Physics Department. The retest shall be conducted before the end semester exam and the portions will include LASERS, Fiber Optics, Acoustics and Crystallography.
- The marks for laboratory sessions shall be awarded based on independent experiments, observation, accuracy, etc.
- A student has to score a minimum of 35 % marks or $X_{avg}/2$ (whichever is higher) to get a pass.

- Those who fail in the course can appear for the re-assessment exam. The laboratory and internal marks shall be considered till his programme duration.
- The total marks will be for 100 % including the theory and lab put together, of which 2 part will be for the theory and 1 part will be for the laboratory.
- Any misbehavior, indiscipline in the classroom/laboratory/exam hall will be dealt with seriously. A student who is suspected of cheating in examinations, copying, plagiarism, is liable to disciplinary action including (but not limited to) the award of negative mark or zero mark or even the F-grade. In the worst case of misbehavior/malpractice, the departmental disciplinary committee is empowered to impose other penalties appropriate and proportionate to the offence.

ADDITIONAL COURSE INFORMATION

The lecture materials such as power point presentations, problems and video lectures can be received from the faculty members. The individual faculty members can be contacted in person for further discussions and clarifications on a mutually convenient time.

FOR SENATE'S CONSIDERATION

Sd/-

Course Faculty _____ **CC-Chairperson** _____

HOD _____