

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

Course Title	Physics - I	Branch	Civil (A) engineering
Course Code	PHIR11	No. of Credits	3 (2 credit theory+1 credit lab)
Department	Physics	Faculty	Dr. L. DHIVYA
Pre-requisites Course Code	-NIL-		
Course Coordinator(s) (if, applicable)	Dr. S. Manivannan Dr. N. V. Giridharan		
Course Teacher(s)/Tutor(s) E-mail	Details with first year coordinator office	Telephone No.	9962722886
Course Type	<input checked="" type="checkbox"/> Core course		<input type="checkbox"/> Elective course
COURSE OVERVIEW			
The Physics-I course is offered in the first semester to Civil A engineering. The subject has a weightage of 2 credit theory and 1 credit practical lab.			
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 in-depth 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	2 nd week Aug-4 th week Aug	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, power point presentations, Class room discussions.

2	1 st week Sep-3 rd week Sep	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 Crucible Technique, Vapour phase Oxidation Process Fiber optic communication principle – fiber optic sensors-other applications of optical fibers.	Lectures, power point presentations, Class room discussions.
3	4 th week Sep-2 nd week Oct	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, power point presentations, Class room discussions.
4	3 rd week Oct-1 st week Nov	Crystallography Crystalline and amorphous solids – lattice and unit cell – seven crystal system 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, power point presentations, Class room discussions.
5	2 nd week Nov-4 th week Nov	Magnetic materials, conductors and Superconductors <i>Magnetic materials:</i> Definition of terms – classification of magnetic materials and properties – domain theory of ferromagnetism- hard and soft magnetic materials – applications. <i>Conductors:</i> classical free electron theory (Lorentz –Drude theory) – electrical conductivity <i>Superconductors:</i> definition – Meissner effect – type I & II superconductors – BCS theory (qualitative) – high temperature superconductors – Josephson effect – quantum interference (qualitative) – SQUID – applications.	Lectures, power point presentations, Class room discussions.

COURSE ASSESSMENT METHODS				
S.N o.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Quiz- I	Sep 1 st week (Lasers)	30 minutes	10%
2	Mid semester exam (short questions, descriptive questions, Assignment)	Oct 3 rd week (Lasers, Fibre Optics, Acoustics)	90 minutes	30%
3	Quiz – II	Nov 2 nd week (Crystallography)	30 minutes	10%
4	Semester exam	As per institute time table	180 minutes	50%
			Total	100%
5	Practicals	Five experiments (i) Torsional pendulum (ii) Numerical aperture of an optical fiber (iii) Radius of Curvature of lens-Newton's Rings (iv) Conversion of galvanometer into ammeter and voltmeter (v) Dispersive power of a prism- Spectrometer	3 hours 3 hours 3 hours 3 hours 3 hours	20 % 20 % 20 % 20 % 20 %
			Total	100%
	No separate semester exam for laboratory Each lab session carries equal weightage (i.e. 20% of lab weightage) Theory weightage: 2/3 Practicals weightage : 1/3			
ESSENTIAL READINGS				
<u>Text Books, Reference Books & Web-links:</u>				
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> 6. <i>Practical Physics, R.K. Shukla, Anchal Srivastava, New age international (2011)</i> 7. <i>B.Sc. Practical Physics, C.L Arora, S. Chand & Co. (2012)</i> 8. http://www.doitpoms.ac.uk/ 9. http://vlab.co.in/index.php				

COURSE EXIT SURVEY

Performance in the assessment methods

Feedback from the student on the knowledge gained, subjects relevant to the course, methodology adopted aspect of improvement.

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

- It is mandatory to have a minimum of 75% attendance to appear in the final examination.
- Student(s) having *less than 75% attendance* will *NOT* be *allowed* in semester examination and will be given *V grade*. Further, the student(s) *should REDO* the course and can get a grade based on the performance in all the assessments.
- Failing in fulfilling the minimum requirements in REDOing would lead the student(s) to opt again either for *REDOing* or *Formative Assessment*.
- Those who are absent for the assessment tests on genuine grounds shall be given an opportunity only once for the retest with the prior permission of concerned faculty member and Head of Physics Department. The retest shall be conducted before the end semester exam and the portion will be Lasers, Fibre Optics, Acoustics and Crystallography.
- The marks for laboratory sessions shall be awarded based on independent experiments, observations, accuracy, etc.
- Each student should score a minimum of, (i) either $\frac{\text{Class average}}{2}$ or (ii) 35%, but whichever is higher to pass in the course.
- Those who fail in the course can appear for the supplementary exam. The marks including laboratory and internal marks shall be considered till his/her B.Tech. programme duration.
- The total marks will be for 100% including the theory and lab put together, of which 2/3 part (66.66%) will be for the theory and 1/3 part (33.33%) will be for the laboratory.
- Any misbehavior, indiscipline in the classroom/laboratory/exam hall will be dealt with seriously. In the worst case, the final resolution will be taken by the departmental disciplinary committee.

ADDITIONAL COURSE INFORMATION

The individual faculty members can be contacted in person for further discussions and clarifications on a mutually convenient time

FOR SENATE'S CONSIDERATION

Course Faculty

L. Dhruva

CC-Chairperson _____

HOD

R. Ropala