NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE OUTLINE				
Course Title	**Physics – I**	**Branch : CSE –B**		
Course Code	**PHIR 11**	**No. of Credits**	**3 (2 theory + 1 lab)**	
Department	Physics	**Faculty**	**Dr. C. Ganeshraj**	
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 available with first year coordinator office		**Telephone No.**	(0431) 250 3616 (0431) 250 3613
Course Type	☑**Core course** ☐ Elective course			

COURSE OVERVIEW

The Physics-I (PHIR11) course is offered in the first semester to CSE B. The subject has 3 credit in total (2 credits for theory and 1 credit for laboratory experiments).

COURSE OBJECTIVES

- To make a bridge between the physics and engineering courses.
- To introduce the comprehensive ideas about technologically important application oriented topics in Physics such as Lasers, Fiber Optics and Acoustics.
- To introduce an overview on classification of solid state of matters – crystalline and amorphous phases – and X-ray diffraction of crystals.
- To introduce fundamental physics behind the technologically important classes of materials such as magnetic materials, conductors and super conductors.

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.	1. Obtain in-depth knowledge on important Physics concepts. 2. Carry out independent research work in interdisciplinary areas. 3. Interact with professionals in related areas. 4. Communicate ideas and learn new technologies.

COURSE TEACHING AND LEARNING ACTIVITIES			
S.No.	**Week**	**Topics**	**Mode of Delivery**
1.	2nd week of Aug	**Lasers:** Introduction to Laser-characteristics of Lasers-Spontaneous and stimulated emissions Einstein's coefficients	**Lectures (L), power point Presentations (PPT), Class room Discussions (CD).**
	3rd week of Aug	population inversion and lasing action laser systems: Ruby laser, He-Ne Laser	**L, PPT and CD**
	4th week of Aug	semiconductor laser applications:– Holography- CD-drive – industrial and medical applications.	**L, PPT and CD**
	5th week of Aug	**Fiber Optics :** Fermat's principle and Snell's law-optical fiber Principle and construction.	**L, PPT and CD**
	1st week of Sep	acceptance cone - numerical aperture – V-Number Types of fibers.	**L, PPT and CD**
	2nd week of Sep	Fabrication: Double Crucible Technique, Vapour phase Oxidation Process Fiber optic communication principle – fiber optic sensors-other applications of optical fibers.	**L, PPT and CD**
	3rd week of Sep	**Acoustics :** Characteristics of musical sound – loudness – Weber-Fechner law – decibel Absorption coefficient	**L, PPT and CD**
	4th week of Sep	reverberation – reverberation time Sabine's formula – acoustics of buildings	**L, PPT and CD**
	1st week of Oct	Ultrasonics- Production of ultrasonics using piezoelectric method –magnetostriction method- applications.	**L, PPT and CD**
	2nd week of Oct	**Crystallography :** Crystalline and amorphous solids – lattice and unit cell – seven crystal system and Bravais lattices.	**L, PPT and CD**

	3rd week of Oct	symmetry operation -Miller indices Atomic radius – coordination number – packing factor calculation for sc, bcc, fcc.	**L, PPT and CD**
	4th week of Oct	Bragg's law of X-ray diffraction –Laue Method- powder crystal method.	**L, PPT and CD**
	1st week of Nov	***Magnetic materials:*** Definition of terms – classification of magnetic materials and properties – domain theory of ferromagnetism- hard and soft magnetic materials – applications.	**L, PPT and CD**
	2nd week of Nov	***Conductors:*** classical free electron theory (Lorentz –Drude theory) – electrical conductivity.	**L, PPT and CD**
	3rd week of Nov	***Superconductors:*** definition – Meissner effect – type I & II superconductors – BCS theory (qualitative) – high temperature superconductors.	**L, PPT and CD**
	4th week of Nov	Josephson effect – quantum interference (qualitative) – SQUID – applications.	**L, PPT and CD**
	2nd week of Aug	**Lab.Expt.** 1) Torsional pendulum and 2) Numerical Aperture of an optical fiber.	**Demonstration**
	3rd week of Aug	**Lab.Expt.** 3) Radius of curvature of lens-Newton's rings, 4) Conversion of galvanometer into ammeter and voltmeter and Dispersive power of a prism spectrometer.	**Demonstration**

COURSE ASSESSMENT METHODS				
S.No.	**Mode of Assessment**	**Week/Date**	**Duration**	**% Weightage**
1.	Quiz- I	1st week of Sep.	30 min	10 %
2.	Mid-term Test	3rd week of Oct	60 min	20 %
3.	Quiz – II	2nd week of Nov.	30 min	10 %
4.	Assignment	4th week of Nov	N.A.	10%
5.	Semester exam.	Dec 11-22, 2017	180 min	50 %
			Total (theory)	**100 %**
5.	**Practicals**			
	1) Torosonal pendulum	1st week of Sep	3 h	20 %
	2) Numerical aperature of an Optical Fiber	2nd week of Sep	3h	20 %
	3) Radius of curvature of lens – Newton's rings	3rd week of Sep	3h	20 %
	4) Conversion of galvanometer into ammeter and voltmeter	1st weel of Oct	3h	20 %
	5) Dispersive power of a prism : spectrometer	2nd week of Oct	3h	20 %
	Repeat	4th week of Oct.	3h	
	➢ No separate semester examination for laboratory practicals. ➢ Each laboratory experiment carries 20% (equal weightage). ➢ The total weigtage : Theory weigtage : 2/3 (66.66 %) + Laboratory weigtage : 1/3 (33.33%)			

ESSENTIAL READINGS :

Text Books

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).

Reference Books

1. Laser Fundamentals, William T. Silfvast, 2nd edn, Cambridge University press, New York (2004).
2. Fundamentals of Physics, 6th Edition, D. Halliday, R. Resnick and J. Walker, John Wiley and Sons, New York (2001).
3. Introduction to solid state physics,7th Edn, Charls Kittel, Wiley, Delhi (2007).

COURSE EXIT SURVEY

- Performance in the exams and assignments
- Questionnaire about the method of teaching and theoretical knowledge gained in the course.

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

- It is mandatory to have a minimum of 75% attendance (including medical and on duty) to take up semester examination.
- The students who indulge in malpractice such as copying, plagiarism shall have to *redo* the course and rewrite the exam along with subsequent batch students.
- Those who are absent for any of the assessment tests on genuine grounds will be given an opportunity for a *retest* only. For *retest*, the student should get prior permission from concerned faculty member. The retest will be conducted before the semester exam and the portions would be **laser, fiber optics, acoustics and crystallography** before the end semester examination.
- The marks for laboratory sessions shall be awarded based on independent experiments, observation, accuracy, skill, punctuality, neatness, etc.
- A student has to score a minimum mark either class average/2 or 35 % whichever is higher.
- Those who fail in the course can appear for the supplementary exam. The laboratory and internal marks shall be considered till his/her B.Tech. programme duration.
- The total mark for the evaluation of the course is 100 % (for theory 66.66 % (2/3) and laboratory practical 33.33 % (1/3)).
- Any misbehavior, indiscipline in the classroom/laboratory/exam hall will be dealt with seriously. In the worst case, final decision will be taken by the departmental disciplinary committee.

ADDITIONAL COURSE INFORMATION

The lecture materials such as PPT presentation / notes, problems and video lectures will be available with the course faculty. The individual faculty members can be contacted through phone or in person for further discussions and clarifications on a mutually convenient time.

FOR SENATE'S CONSIDERATION

Course Faculty C. Lavanya

CC-Chairperson _____

HOD Dr. Gopala Krishna