NATIONAL INSTITUTE OF TECHNOLOGY TIRUCHIRAPPALLI

COURSE OUTLINE			
Course Title	Physics - I	**Branch**	Production Engineering
		Section	A
Course Code	PHIR 11	**No. of Credits**	3 (2 theory + 1 lab)
Department	Physics	**Faculty**	Dr. K. Balamurugan
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 all branches of engineering. This is a three credit course (2 credits for theory and 1 credit for laboratory experiments).

COURSE OBJECTIVES

- To make a bridge between the physics in school 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 superconductors.

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)
1. Knowledge on the physics and applications of lasers, fiber optics, acoustics, crystallography, magnetic materials, conductors and super-conductors. 2. Hands on practical experiences in handling lasers, optical fibers and many other tools for engineering / laboratory applications. 3. An overview on making of various types of lasers, optical fibers, acoustic engineering, crystalline materials, technologically important magnetic, conducting and superconducting materials and applications. 4. Experience in acquiring information from other resources such as websites, science & engineering forums and peer-reviewed	➢ Students get induced to know the role of production engineering behind many technological devices & instruments. ➢ Students will get ideas about the role of accuracy involving in manufacturing. ➢ Students will know that the choice of materials for making things matters for applications. ➢ Students will get practice for self-education, finding resources and for complete learning up to date. ➢ Students will get know about the

journals etc. (by the assignment work) 5. Solving problems that are related to various topics of the course that are customized for the Production Engineering branch.	influences of physics on parameters for custom-designed equipment / tools / products.

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week	Topics in Theory	Mode of Delivery
1.	1 – 3 (August)	**Lasers** ✦ Introduction to laser & its characteristics ✦ Spontaneous & stimulated emissions ✦ Einstein's theory on population inversion and lasing action ✦ Laser systems: Ruby, He-Ne and Semiconductor lasers ✦ Applications of lasers ✦ Summary / Sample problems	Chalk & Talk / ppt presentation.
2.	4 – 6 (September)	**Fiber Optics** ✦ Introduction & Physics of / for / in optical fibers ✦ Types of optical fibers ✦ Fabrication of optical fibers ✦ Fiber optic communications ✦ Fiber optic sensors & other applications ✦ Summary / Sample problems	Chalk & Talk / ppt presentation.
3.	7 – 8 (September & October)	**Acoustics** ✦ Characteristics and measure of intensity of sound / music & absorption coefficient ✦ Reverberation, Sabine's formula and acoustics of buildings ✦ Ultrasonic waves, its production & applications ✦ Summary / Sample problems	Chalk & Talk / ppt presentation.
4.	9 – 10 (October)	**Crystallography** ✦ Classifications of solids and crystal structure & symmetry ✦ Miller indices and packing fraction of SC, BCC & FCC unit cells ✦ Bragg's law & X-ray diffraction methods ✦ Summary / Sample problems	Chalk & Talk / ppt presentation.
5.	11 – 13 (November & December)	**Magnetic materials, Conductors and superconductors** ✦ Introduction to magnetism and magnetic materials classification ✦ Ferromagnetism, materials' classifications	Chalk & Talk / ppt

		& applications ✦ Classical free electron theory and electrical conductivity ✦ Discovery and definition and classification of super-conductors ✦ BCS theory & High T_c superconductors ✦ Josephson's effect, SQUID devices and applications ✦ Summary / Sample problems.	presentation.

COURSE ASSESSMENT METHODS

S.No.	Assessment by	Week / Date	Duration	Weightage
1.	Quiz I	End of 3rd week (*Topic:* Lasers)	30 min	10 %
2.	Mid-term exam.	End of 8th week (*Topics:* Fiber Optics and Acoustics)	60 min	20 %
3.	Quiz II	End of 10th week (*Topic:* Crystallography)	30 min	10 %
4.	Assignment	End of 13th week (Topics: Ssuperconductors and its engineering / industrial applications)	N.A.	10 %
5.	Semester exam.	In the time window od 11 to 22 Dec. 2017 (As per NITT schedule)	180 min	50 %
			Total (theory)	**100 %**

Practicals

1. Torsional pedulum	20 %
2. Numerical apertaure of an optical fiber	20 %
3. Conversion of galvanometer into ammeter and voltmeter	20 %
4. Dispersive power of a prism	20 %
5. Radius of curvature of a lens – Newton rings	20 %
Total (practical)	**100 %**

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, Charles Kittel, Wiley, Delhi (2007).

COURSE EXIT SURVEY

- All students will be given a feedback form and get chance to give a written feedback, yet without any compulsion.
- Students can optionally give their feedbacks orally as well (which depends on the time availability towards the end of the course time.)

COURSE POLICY

Attendance:

- It is mandatory to have a min. of 75% attendance to appear in the semester examination.
- Already, 25% of attendance has been relaxed for any sickness, family ceremony / festivals and academic / sport activities or any industrial visits etc.
- Student(s) having *less than 75% attendance* will not be allowed in semester examination.

Minimum mark to pass the course:

- From the total marks obtained in the theory component of the course, ⅔ will be taken for final grading.
- From the total marks obtained in the laboratory practical component of the course, ⅓ will be taken for final grading.
- To pass in the course each student should score a minimum total (sum of ⅔ from theory and ⅓ from practical) of either $\frac{Class\ average}{2}$ or 35%, but whichever is higher.

Plagiarism, academic honesty & indiscipline activities etc.:

- Those who indulge in malpractice such as copying, plagiarism will get punishment which may lead to REDO the course (depending on the actual intensity of the activity).
- 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(s) should get prior permission from concerned faculty member (course teacher), Course coordinators and Head of the Department of Physics. The retest will be covering the topics of Lasers, Fiber Optics, Acoustics and Crystallography.
- The marks for laboratory sessions shall be awarded based on independent experiments, observation, accuracy, skill, punctuality, neatness, etc.
- 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.
- Any misbehavior, indiscipline in the classroom / laboratory / examination hall will be dealt with seriously. In the worst case, the institute's disciplinary committee is empowered to debar the student from the course.

ADDITIONAL COURSE INFORMATION

The lecture materials such as ppt presentation / notes, problems and video lectures shall be displayed by the faculty members. 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 Balamurugan [Dr. K. BALAMURUGAN]

HOD Dr. Gopalakrishna

CC: Chairman