DEPARTMENT OF CIVIL ENGINEERING

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Name of the programme and specialization	B. Tech		
Course Title	Physics - I		
Course Code	PHIR11	No. of Credits	3 (2T + 1L)
Course Code of Pre-requisite subject(s)	-	-	-
Session	July 2018	Section (if, applicable)	B
Name of Faculty	Dr. N. BASKARAN	Department	Physics
E-mail	nbaski@nitt.edu	Telephone No.	9943562402
Name of Course Coordinator(s) (if, applicable)	Dr. NVG and Dr. SM		
E-mail		Telephone No.	
Course Type	GR Core course	☐ Elective course	

Syllabus (approved in BoS)

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.

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- fiber optic communication principle – fiber optic sensors.

Acoustics Introduction -reverberation – reverberation time – Sabine's formula – acoustics of buildings – ultrasonics – production of ultrasonics using piezoelectric method –magnetostriction method-applications.

Crystallography Seven crystal systems and Bravais lattices– Miller indices – interplanar distance-symmetry operation -Bragg's law of X-ray diffraction –Laue Method- powder crystal method- structure determination for cubic system.

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 effects applications.

Special theory of relativity Lorentz transformation -Time dilation – length contraction- mass-energy relation.

References

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)
4. Concepts of Modern Physics. Arthur Beiser, Tata McGraw-Hill, New Delhi (2010).
5. Fundamentals of Physics, R. Shankar, Yale University Press, New Haven and London (2014).

COURSE OBJECTIVES

To introduce the notions of light matter interaction, fabrication of lasers, light propagation in waveguides, applications of lasers and optical fibers.

To understand the fundamentals of acoustics, crystal physics and structure determination of crystals. To learn the fundamentals of magnetic, electrical and superconducting materials.

To introduce the thoughts of special theory of relativity.

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)
1. Basic understanding and applications of lasers will be learned	Students will gain sufficient knowledge/ understanding of basic physics, and learn to apply them for potential engineering applications.
2. Knowledge of fiber optics and acoustics of buildings will be gained	
3. Insightful information about crystal structures and various materials properties will be obtained.	
4. Basic principles of special theory of relativity will be learned	

COURSE PLAN – PART II

COURSE OVERVIEW

This course is offered to students in their first semester of B. Tech programme, and is aimed at motivating students to learn nessary basic physics relevant to their engineering domain.

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week	Topics to be covered	Mode of Delivery
1	1-3	Lasers	C & T
2	4-6	Fiber Optics	C & T
3	7-9	Acoustics	C & T
4	10-12	Crystallography	C & T
5	13-15	Magnetic materials and super conductors	C & T

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assesment 1	5th week	1 h	20
2	Assesment 2	11th week	1 h	20
3	Assingments (2-3)	During the session	-	10
4	CPA	12th week	1 h	
6	Final Assessment *	3rd week of Dec.	3 h	50

*mandatory; refer to guidelines on page 4

COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)

Feedback from the students will be collected based on the knowledge gained, effectiveness of the content and the lecture delivered.

COURSE POLICY (preferred mode of correspondence with students, compensation assessment policy to be specified)

Students can use both e-mail and phones to communicate with me.

COMPENSATION ASSESSMENT POLICY

As per the institute norms

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

- At least 75% attendance in each course is mandatory.
- A maximum of 10% shall be allowed under On Duty (OD) category.
- Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.

ACADEMIC DISHONESTY & PLAGIARISM

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.

ADDITIONAL INFORMATION

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FOR APPROVAL

Course Faculty N. Basheer CC-Chairperson S.T. Bevan HOD G. M