

**NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI**

<b>COURSE OUTLINE TEMPLATE</b>			
<b>Course Title</b>	Physics-I		
<b>Course offered to</b>	I Semester-B.Tech. Metallurgical and materials Branch		
<b>Course Code</b>	PH-IR11	<b>No. of Credits</b>	3
<b>Department</b>	Physics	<b>Faculty</b>	Dr. M.C. Santhosh Kumar
<b>Pre-requisites Course Code</b>	Nil		
<b>Course Coordinator(s) (if, applicable)</b>	Dr. N.V. Giridharan Dr. S. Manivannan		
<b>Other Course Teacher(s)/Tutor(s) E-mail</b>	santhoshmc@nitt.edu	<b>Telephone No.</b>	04312503611
<b>Course Type</b>	<input checked="" type="checkbox"/> Core course <input type="checkbox"/> Elective course		
<b>COURSE OVERVIEW</b>			
<p>The Physics- I course is offered in the first semester to all the branches of engineering. The subject has 2 credit theory and 1 credit lab weightage.</p>			
<b>COURSE OBJECTIVES</b>			
<ul style="list-style-type: none"> <li>• To make a bridge between the Physics in school and engineering courses.</li> <li>• To introduce the basic concepts of modern science like Photonics,</li> <li>• Engineering applications of acoustics, fundamentals of crystal physics and materials science.</li> </ul>			
<b>COURSE OUTCOMES (CO)</b>			
<b>Course Outcomes</b>	<b>Aligned Programme Outcomes (PO)</b>		
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	➤ 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		
<b>COURSE TEACHING AND LEARNING ACTIVITIES</b>			

<b>S.No.</b>	<b>Week</b>	<b>Topic</b>	<b>Mode of Delivery</b>
<b>1</b>	Aug 2 <sup>nd</sup> week	Introduction to Laser- characteristics of Lasers- Spontaneous and stimulated emissions	PPT/ Chalk & Talk
<b>2</b>	Aug 3 <sup>rd</sup> week	Einstein's coefficients – population inversion and lasing action, Ruby laser,	PPT
<b>3</b>	Aug 4 <sup>th</sup> week	He-Ne Laser, Semiconductor laser	PPT
<b>4</b>	Aug 5 <sup>th</sup> week	applications:–Holography- CD- drive – industrial and medical applications.	PPT
<b>5</b>	Sep 1 <sup>st</sup> week	Fiber Optics Fermat's principle and Snell's law-optical fiber – principle and construction	PPT/ C&T
<b>6</b>	Sep 2 <sup>nd</sup> week	Acceptance cone - numerical aperture - V-Number, types of fibers, Fabrication: Double Crucible Technique, Vapour, phase Oxidation Process	PPT/C&T
<b>7</b>	Sep 3 <sup>rd</sup> week	Fiber optic communication principle – fiber optic sensors- other applications of optical fibers.	PPT
<b>8</b>	Sep 4 <sup>th</sup> week	Acoustics - Characteristics of musical sound	C&T
<b>9</b>	Oct 1 <sup>st</sup> week	loudness – Weber-Fechner law – decibel – absorption coefficient – reverberation – reverberation time – Sabine's formula –	C&T
<b>10</b>	Oct 2 <sup>nd</sup> week	Acoustics of buildings – ultrasonics – production of ultrasonics using piezoelectric method –magnetostriction method- applications.	C&T
<b>11</b>	Oct 3 <sup>rd</sup> week	Crystallography - Crystalline and amorphous solids – lattice and unit cell – seven crystal system and Bravais lattices – symmetry operation	PPT/ Demonstration/C&T
<b>12</b>	Oct 4 <sup>th</sup> week	Miller indices – atomic radius – coordination number – packing factor calculation for sc, bcc, fcc – Bragg's law of X-ray	C&T

		diffraction –Laue Method powder crystal method.		
<b>13</b>	Nov 1st week	Magnetic materials, conductors and superconductors Magnetic materials: Definition of terms – classification of magnetic materials and properties – Domain theory of ferromagnetism	C&T	
<b>14</b>	Nov 2 <sup>nd</sup> week	Hard and soft magnetic materials – applications. Conductors: classical free electron theory (Lorentz – Drude theory) – electrical conductivity	C&T	
<b>15</b>	Nov 3 <sup>rd</sup> week	Superconductors: definition – Meissner effect – type I & II superconductors – BCS theory (qualitative)	PPT	
<b>16</b>	Nov 4 <sup>th</sup> week	High temperature superconductors – Josephson effect – quantum interference (qualitative) – SQUID – applications.	PPT	
<b>17</b>	Nov 5 <sup>th</sup> week	Discussions and re-assessment	PPT	
<b>18</b>	Aug 2 <sup>nd</sup> week	Lab Demonstration	Hands on training sessions	
<b>19</b>	Aug 3 <sup>rd</sup> week	Lab Demonstration	Hands on training sessions	
<b>COURSE ASSESSMENT METHODS</b>				
<b>S.No.</b>	<b>Mode of Assessment</b>	<b>Week/Date</b>	<b>Duration</b>	<b>% Weightage</b>
<b>1.</b>	<b>Quiz- I</b>	<b>1<sup>st</sup> week of Septemebr</b>	<b>30 min</b>	<b>10 %</b>
<b>2.</b>	<b>Mid semester exam</b>	<b>3<sup>rd</sup> week of October</b>	<b>90 min</b>	<b>30 %</b>
<b>3.</b>	<b>Quiz – II</b>	<b>1st week of Noeber</b>	<b>30 min</b>	<b>10 %</b>
<b>4.</b>	<b>Re-assessments</b>	<b>4<sup>th</sup> Week of Novmber</b>	<b>60 min</b>	<b>Appropriate weitage will be calculated</b>

5.	Semester exam	2 <sup>nd</sup> week of December	180 min	50 %
	Total Theory			100%
6	Practicals	List of Experiments		Weightage
	Aug 4 <sup>th</sup> week	Tortional pendulum		20%
	Aug 5 <sup>th</sup> week	Convesion of Galvanometer into ammeter		20%
	Sep 1 <sup>st</sup> week	Dispersive power -spectrometer		20%
	Sep 2 <sup>nd</sup> week	Newton's rings		20%
	Sep 3 <sup>rd</sup> week	Numerical aperture of an Optical fiber		20%
	Repeat lab Sep 4 <sup>th</sup> week			
	Total Practical			100%
	<p>No separate semester exam for laboratory  Each lab session carries equal weightage  Theory weightage: 2/3  Practicals weightage : 1/3  Pass criteria = Class average/2 or 35% whichever is higher.</p>			
<b>ESSENTIAL READINGS : Textbooks, reference books Website addresses, journals, etc</b>				
<ol style="list-style-type: none"> <li>1. A text book of Engineering Physics, M.N. Avadhanulu and P.G. Kshirsagar, S. Chand and Company, New Delhi (2009).</li> <li>2. Engineering Physics, R.K. Gaur and S.L. Gupta, Dhanpat Rai Publications (P) Ltd., 8th edn., New Delhi (2001).</li> <li>3. Laser Fundamentals, William T. Silfvast, 2nd edn, Cambridge University press, New York (2004)</li> <li>4. Fundamentals of Physics, 6th Edition, D. Halliday, R. Resnick and J. Walker, John Wiley and Sons, New York (2001).</li> <li>5. Introduction to Solid State Physics, 7th Edn, Charles Kittel, Wiley, Delhi (2007).</li> </ol>				

**COURSE EXIT SURVEY (mention the ways in which the feedback about the course is assessed and indicate the attainment also)**

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

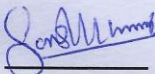
**COURSE POLICY (including plagiarism, academic honesty, attendance, etc.)**

- 75 % attendance is mandatory.
- Those who indulge in malpractice such as copying, plagiarism shall 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 be upto Unit IV.
- The marks for laboratory sessions shall be awarded based on independent experiments, observation, accuracy, etc.
- Marks to get a pass is as per NIT B.Tech. regulations.
- Those who fail in the course can appear for the supplementary exam. The marks including 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. In the worst case, the departmental disciplinary committee is empowered to debar the student from the course.

**ADDITIONAL COURSE INFORMATION**

The teachers can be contacted through phone or in person for clarifications by the student on a mutually convenient time or through e-mail: [santhoshmc@nitt.edu](mailto:santhoshmc@nitt.edu)

**FOR SENATE'S CONSIDERATION**

Course Faculty 

CC-Chairperson \_\_\_\_\_

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