



# NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE PLAN – PART I			
Name of the programme and specialization	B. Tech. / Electrical and Electronics Engineering		
Course Title	PHYSICS		
Course Code	PHIR11	No. of Credits	3
Course Code of Pre-requisite subject(s)	NIL	-	-
Session	July/ Jan- <u>2020</u>	Section (if, applicable)	EEE - B
Name of Faculty	Dr. R. SANKARANARAYANAN / Dr. N.GOPALAKRISHNAN	Department	PHYSICS
Official Email	<a href="mailto:sankar@nitt.edu">sankar@nitt.edu</a> / <a href="mailto:ngk@nitt.edu">ngk@nitt.edu</a>	Telephone No.	0431 - 2503609/07
Name of Course Coordinator(s) (if, applicable)	Dr. R. Sankaranarayanan		
Official E-mail	<a href="mailto:sankar@nitt.edu">sankar@nitt.edu</a>	Telephone No.	0431-2503609
Course Type	Core / <del>Elective</del>		
SYLLABUS (as approved in Senate)			
<p><b>Lasers</b> Introduction to Laser – characteristics of Lasers – spontaneous and stimulated emissions – Einstein’s coefficients – population inversion and lasing action – laser systems: He-Ne laser, semiconductor laser – applications.</p> <p><b>Fiber Optics</b> Snell’s law – optical fiber – principle and construction – acceptance cone – numerical aperture – types of fibers – fiber optic communication principle – fiber optic sensors.</p> <p><b>Quantum Mechanics</b> Inadequacy of classical mechanics – black body radiation, photo electric effect – wave and particle duality of radiation – de Broglie concept of matter waves – electron diffraction – Hisenberg’s uncertainty principle – Schrodinger’s wave equation – eigenvalues and eigenfunctions – superposition principle – interpretation of wave function – particle confined in one dimensional infinite square well potential.</p> <p><b>Nuclear and Particle Physics</b> Nuclear properties and forces – nuclear models – shell model – nuclear reaction – radioactivity – types and half-life. Fundamental forces – particle physics – classification of matter – quark model.</p>			

**Physics of Advanced Materials**

Conductors: classical free electron theory (Lorentz-Drude theory) – electrical conductivity. Superconductors: definition – Meissner effect – type I & II superconductors – BCS theory (qualitative). Nanomaterials: Introduction and properties – synthesis – top-down and bottom-up approach – applications.

**References:**

1. Optic 3<sup>rd</sup> edition, Ajoy Ghatak, Tata McGraw-Hill, 2005 (Ch. 23 – Lasers, Ch. 24 – Fiber Optics).
2. Concepts of Modern Physics 6<sup>th</sup> edition, Arthur Beiser, Tata McGraw-Hill, 2003, (Ch. 5 – Quantum Mechanics, Ch. 11,12 & 13 – Nuclear and Particle Physics)
3. Introduction to Solid State Physics 8<sup>th</sup> edition, C. Kittel, John Wiley & Sons, 2005.

**COURSE OBJECTIVES**

- To introduce the principle and properties of laser with applications.
- To introduce principle and working of optical fiber with applications.
- To introduce mechanics of complex matter waves relevant to understand all phenomena at atomic scale.
- To understand the structure of nucleus and reactions taking place within it.
- To impart knowledge on basics of conductors, superconductors and nanomaterials with applications.

Mapping of COs with POs

Course Outcomes (CO)

Programme Outcomes (PO)

1. Principle of laser light and its applications will be appreciated.

PO1

2. Principle of optical fiber and modern communications will be appreciated.

PO3

3. Probabilistic nature of matter in atomic scale will be realized.

PO5

4. Familiarizing with fundamental particles that make up the matter

PO5

5. Physics of certain exotic properties of matter will be appreciated.

PO5

<b>COURSE PLAN – PART II</b>				
<b>COURSE OVERVIEW</b>				
Same as course objectives				
<b>COURSE TEACHING AND LEARNING ACTIVITIES</b>				
S. No.	Week/Contact Hours	Topic	Mode of Delivery	
1	8 hours	Lasers	Chalk and talk / PPT	
2	6 Hours	Fiber Optics	Chalk and talk / PPT	
3	10 Hours	Quantum Mechanics	Chalk and talk	
4	8 Hours	Nuclear and Particle Physics	Chalk and talk / PPT	
5	8 hours	Physics of Advanced Materials	Chalk and talk / PPT	
<b>COURSE ASSESSMENT METHODS (shall range from 4 to 6)</b>				
S. No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	I Cycle Test	6 <sup>th</sup> week	1 Hour	25
2	II Cycle Test	12 <sup>th</sup> week	1 Hour	25
3	Assignment	13 <sup>th</sup> week	-	20
CPA	Compensation Assessment*	15 <sup>th</sup> week	1 Hour	25
4	Final Assessment *	16 <sup>th</sup> week	3 Hours	30
*mandatory; refer to guidelines on page 4				
<b>COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)</b>				
Feedback will be conducted through online (MIS) for self assessment.				
<b>COURSE POLICY (including compensation assessment to be specified)</b>				
<ul style="list-style-type: none"> <li>Students who are absent in I or/and II Cycle Tests on genuine grounds, are permitted to appear for one compensation assessment with prior permission from faculty member. Portions for this assessment will be the combined portions of I &amp; II Cycle Tests with weightage of 20%.</li> <li>Assignment is a group activity with maximum of three students.</li> </ul>				
<b><u>ATTENDANCE POLICY</u> (A uniform attendance policy as specified below shall be followed)</b>				
<ul style="list-style-type: none"> <li>At least 75% attendance in each course is mandatory.</li> <li>A maximum of 10% shall be allowed under On Duty (OD) category.</li> <li>Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.</li> </ul>				

### 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.
- The above policy against academic dishonesty shall be applicable for all the programmes.

### ADDITIONAL INFORMATION (if any)

Students are encouraged to meet faculty for academic discussion at any time.

### FOR APPROVAL

Course Faculty

  
(24.12.2020)

1. Dr. R. Sankaranarayanan

  
24.12.2020

2. Dr. N. Gopalakrishnan

  
CC-Chairperson:

HOD:

### Guidelines

- a) The number of assessments for any theory course shall range from 4 to 6.
- b) Every theory course shall have a final assessment on the entire syllabus with at least 30% weightage.
- c) One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered.
- d) The passing minimum shall be as per the regulations.
- e) Attendance policy and the policy on academic dishonesty & plagiarism by students are uniform for all the courses.
- f) Absolute grading policy shall be incorporated if the number of students per course is less than 10.
- g) Necessary care shall be taken to ensure that the course plan is reasonable and is objective.