



DEPARTMENT OF PHYSICS

COURSE PLAN – PART I			
Name of the programme and specialization	III Semester- M.Sc Physics - Solid State Physics		
Course Title	Physics		
Course Code	PH-661	No. of Credits	3
Course Code of Pre-requisite subject(s)	NIL		
Session	July 2019	Section (if, applicable)	Nil
Name of Faculty	Dr.R.Nagalakshmi	Department	Physics
Email	nagalakshmi@nitt.edu	Telephone No.	0431-2503615
Name of Course Coordinator(s) (if, applicable)	Dr. R.Nagalakshmi		
E-mail	nagalakshmi@nitt.edu	Telephone No.	0431-2503615
Course Type (please tick appropriately)	<input type="checkbox"/> Core course <input type="checkbox"/> Elective course		
Syllabus (approved in BoS)			
<p>Unit – I: Introduction</p> <p>Solids – crystalline and amorphous – crystal structure and symmetries – reciprocal lattice – defects and dislocations – Brillouine Zone – <i>types of bonds</i>: van der Waals, covalent, ionic and metallic – atomic scattering factor – geometric structure factor – electrons in aperiodic potential – X-ray diffraction – liquid crystals.</p> <p>Unit – II: Conductors, Semiconductors and Dielectrics</p> <p><i>Conductors</i>: Free electron theory – classical and quantum theory, band theory of solids – effective mass of electron – Kronig-Penny model – Bloch theorem – Hall effect –thermopower. <i>Semiconductors</i>: Types – carrier and Fermi level statistics for intrinsic and extrinsic semiconductors – electrical conductivity. <i>Dielectrics</i>: Types of polarization – frequency dependence of polarization – local electric field – dielectric constant and polarizability – Clausius-Mossotti equation, piezo and ferroelectricity.</p> <p>Unit – III: Transport and Thermodynamic Studies Lattice vibrations – concept and momentum of phonons – vibrations of mono and di-atomic lattices, heat capacity – Einstein and Debye models - Dulong and Petit’s law – Weidemann-Franz law – electronic heat capacity – experimental heat capacity of metals –resistivity – residual resistivity ratio – experimental electrical resistivity of metals – Matthiessen’s rule – Magnetoresistance – Giant and colossal</p>			



magnetoresistance.

Unit – IV: Magnetism

Magnetic terminologies – types of magnetism – dia, para, ferro, ferri and anti-ferromagnetism – Hund’s rules – Curie-Weiss law – Langevin’s classical and quantum theories of dia and para magnetism –Weiss theory of ferromagnetism – Heisenberg model of exchange interaction – concept of domain and hysteresis .

Unit – V: Superconductivity

Superconductivity – Meissner and isotope effect – thermodynamical and optical properties – supercurrents and penetration depth – London’s equations – BCS model conventional – unconventional – critical field – types of superconductors – metal-to-insulator transition –flux quantization – vortex lattice – high Tc superconductors – Josephson Junctions – AC and DC – superfluidity.

COURSE OBJECTIVES

To impart basic knowledge on *Condensed Matter Phase – introduction, Structure and property relationship in materials, classification of materials such as conductors, semiconductors insulators and superconductors*

Students will have an appreciation on the physics and properties of different types of materials such as conductors, semiconductors, dielectric, magnetic and superconductors

MAPPING OF COs with POs

Course Outcomes	Programme Outcomes
Grasping the significance of transport and thermodynamic properties of materials will enable students to understand the basics in physics of condensed mat	To acquire proper knowledge on Materials and its properties

COURSE PLAN – PART II

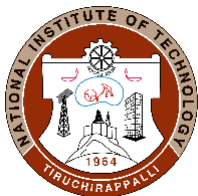
COURSE OVERVIEW

To have an appreciation on the physics and properties of different types of materials such as conductors, semiconductors, dielectric, magnetic and superconducting.

COURSE TEACHING AND LEARNING ACTIVITIES

(Add more rows)

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	1-3	Unit I- Introduction	Power Point Derivations in Board
2	4-6	Unit II - Conductors, Semiconductors and Dielectrics	Problem discussions



3	7-9	Unit III - Transport and Thermodynamic Studies	
4	10-12	Unit IV – Magnetism	
5	13-15	Unit V – Superconductivity	

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Cycle test I	September 3 rd Week	1 hour	20
2	Cycle Test II	November 1 st Week	1 hour	20
3	Assignment on problems	November 3 rd week	1 week will be given for submission	10
4	Final Assessment	December 1 st Week	3 hours	50
5	Compensation Assessment	November 4 th Week	1 hour	Appropriate weightage will be calculated

***mandatory; refer to guidelines on page 4**

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

Institute Policy will be adopted

COURSE POLICY (including compensation assessment to be specified)

MODE OF CORRESPONDENCE (email/ phone etc) : nagalakshmi@nitt.edu,9443940384

COMPENSATION ASSESSMENT POLICY : Retest will be conducted before semester examination on genuine grounds

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

ADDITIONAL INFORMATION, IF ANY

The course teacher is available for discussion and clarification during their free times.
Extra classes may also be conducted based on the necessity

FOR APPROVAL

- Sd
Dr. R. Nagalakshmi
Course Faculty

-sd
Dr. R. Nagalakshmi
CC-Chairperson

-sd
Dr. J. Hemalatha
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.

B.Tech. Admitted in				P.G.
2018	2017	2016	2015	
35% or (Class average/2) whichever is greater.		(Peak/3) or (Class Average/2) whichever is lower		40%

- 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.