NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

DEPARTMENT OF PHYSICS

COURSE PLAN – PART I			
Name of the programme and specialization	**I B.Tech (CSE)**		
Course Title	**Physics - I**		
Course Code	*PHIR11*	**No. of Credits**	**3**
Course Code of Pre-requisite subject(s)	**Nil**		
Session	**January 2019**	**Section (if, applicable)**	**Not applicable**
Name of Faculty	**Dr. M. Ashok**	**Department**	**Physics**
Official Email	**ashokm@nitt.edu**	**Telephone No.**	**2503610**
Co-ordinator	**Dr.M. Ashok** **Dr.R.Sankarnarayanan**		
Official E-mail		**Telephone No.**	
Course Type (please tick appropriately**)**	[√] **Core course**	[ ] ~~**Elective course**~~	

Syllabus (approved in Senate)

Fiber Optics

Snell's law-optical fiber – principle and construction – acceptance cone - numerical aperture –types of fibers - fiber optic communication principle – fiber optic sensors.

Quantum Mechanics

Inadequacy of classical mechanics-black body radiation, photoelectric effect-wave and particle duality of radiation – de Broglie concept of matter waves – electron diffraction – Heisenberg's uncertainty principle – Schrodinger's wave equation – eigen values and eigen functions – superposition principle – interpretation of wave function – particle confined in one dimensional infinite square well potential.

Nuclear and Particle Physics

Nuclear properties and forces - Nuclear models - Shell model - Nuclear reaction

- Radioactivity - types and half-life. Fundamental forces -Particle physics - classification of matter - quark model.

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

COURSE OBJECTIVES

- *To introduce the notions of light matter interaction, fabrication of lasers, light propagation in waveguides, applications of lasers and optical fibers to engineering students.*
- *To comprehend and explain the concepts of matter waves, wave functions andits interpretation to understand the matter at atomic scale.*
- *To teach the fundamentals of nuclear forces, models and classification of matter.*
- *To impart knowledge about the basics of conductors, superconductors, nanomaterials and their applications in science, engineering and technology.*

MAPPING OF COs with POs

Course Outcomes	**Programme Outcomes (PO)** (Enter Numbers only)
• *know principle, construction and working of lasers and their applications in various science and engineering.* • *explain light propagation in optical fibers, types and their applications.* • *experience and appreciate the behaviour of matter at atomic scale, and to impart knowledge in solving problems in modern science and engineering.* • *understand the role of nuclear and particle physics in applications like radioactivity and nuclear reactions.* • *recognize, choose and apply knowledge to develop materials for specific applications for common needs.*	

COURSE PLAN – PART II			
COURSE OVERVIEW			
The Physics- II (PHIR12) course is offered in the second semester to all the noncircuit branches. The subject has 3 credit for theory and 1 credit for lab.			
COURSE TEACHING AND LEARNING ACTIVITIES			**(** Add more rows)
S.No.	**Week/Contact Hours**	**Topic**	**Mode of Delivery**
1	Aug 3rd week	Introduction to Laser-characteristics of Lasers-Spontaneous and stimulated emissions	PPT/ Chalk & Talk
2	Aug 3rd week	Einstein's coefficients – population inversion and lasing action, Ruby laser,	Chalk & Talk
3	Aug 4th week	He-Ne Laser, Semiconductor laser	Chalk & Talk
4	Aug 5th week	Applications:–Holography- CD-drive – industrial and medical applications.	Chalk & Talk
5	Sep 1st week	Fiber Optics Fermat's principle and Snell's law-optical fiber – principle and construction	PPT/ C&T
6	Sep 2nd week	Acceptance cone - numerical aperture - V-Number, types of fibers, Fabrication: Double Crucible Technique, Vapour, phase Oxidation Process	PPT/C&T
7	Sep 3rd week	Fiber optic communication principle – fiber optic sensors-other applications of optical fibers.	Chalk & Talk
8	Next 3 weeks	**Quantum Mechanics** Inadequacy of classical mechanics-black body radiation, photoelectric effect, Compton effect – wave and particle duality of radiation – de Broglie concept of matter waves – electron diffraction – Heisenberg's uncertainty principle – Schrodinger's wave	Lectures and discussion

		equation – eigen values and eigen functions – superposition principle – interpretation of wave function – particle confined in one dimensional infinite square well potential.	
9	Next 3 weeks	**Nuclear and Particle Physics** Nuclear properties and forces - Nuclear models - Shell model - Nuclear reaction - Radioactivity - types and half-life - Stellar nucleosynthesis. Fundamental forces - Particle physics - classification of matter - quark model - neutrino properties and their detection.	Lectures and discussion
10	Next 3 weeks	*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	Lectures and discussion

COURSE ASSESSMENT METHODS (shall range from 4 to 6**)**

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Quiz - I	8th week	1 hour	20%
2	Assignment	10th week		10 %
3	Quiz - II	14th week	1 hour	20%
CPA	Compensation Assessment*		1 hour for 20 marks	
4	Final Assessment *		3 hours	50 %

Total theory	100 %

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

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

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

COURSE POLICY (including compensation assessment to be specified**)**

MODE OF CORRESPONDENCE (email/ phone etc)

The faculty members can be contacted in person for any discussions and clarifications at cabin # 224 and #225 in the first floor of OJAS building on a mutually convenient time.

Email: hemalatha@nitt.edu

ashokm@nitt.edu

COMPENSATION ASSESSMENT POLICY

Those who are absent for Quiz-I or Mid semester exam or Quiz-II, **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 include Quantum Mechanics, Nuclear and Particle Physics, Non Destructive Testing and Vacuum Technology. The Compensation Assessment will be conducted for 20 marks for one hour and it will be converted to carry 5% weightage if the exam to be compensated is either Quiz-I or Quiz- I.

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 marks for laboratory sessions shall be awarded based on independent experiments, observation, accuracy, etc.

- A student has to score a minimum of 35 % marks or Xavg/2 (whichever is higher) to get a pass.
- Those who fail in the course can appear for the re-assessment exam. The laboratory and internal marks shall be considered till his programme duration.
- Any misbehavior, indiscipline in the classroom/laboratory/exam hall will be dealt with seriously. In the worst case of misbehavior/malpractice, the departmental disciplinary committee is empowered to impose penalties appropriate and proportionate to the offence.
- The lecture materials such as power point presentations, problems and video lectures can be received from the faculty members

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. *Concepts of Modern Physics. Arthur Beiser, Tata McGraw-Hill, New Delhi (2010).*

4. Fundamentals of Physics, R. Shankar, Yale University Press, New Haven and London (2014).

5.Fundamentals of Physics II, R. Shankar, Yale University Press, New Haven and London (2016).

6.Introduction to Nanotechnology, C.P. Poole and F.J. Owens, Wiley, New Delhi (2007).

7.Introduction to Solid State Physics, 8th Edition, Charles Kittel, John Wiley & Sons, NJ, USA (2005).

FOR APPROVAL

Course Faculty _____ **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.

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.