NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

DEPARTMENT OF PRODUCTION ENGINEERING

COURSE PLAN – PART I			
Name of the programme and specialization	B. Tech. / Production Engineering		
Course Title	PHYSICS		
Course Code	PHIR11	No. of Credits	3
Course Code of Pre-requisite subject(s)	NIL	-	-
Session	Jan. 2020	Section (if, applicable)	A
Name of Faculty	Dr. N.V.Giridharan	Department	PHYSICS
Official Email	giri@nitt.edu	Telephone No.	0431 - 2503613
Name of Course Coordinator(s) (if, applicable)	Dr. R. Sankaranarayanan and Dr. M. Ashok		
Official E-mail	sankar@nitt.edu, ashokm@nitt.edu	Telephone No.	0431-2503609/3610
Course Type	Core		

SYLLABUS (as approved in Senate)

Lasers

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.

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, 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.

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.

References:

1.Laser Fundamentals, William T. Silfvast, 2ndedn, 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, 8thEdition, Charles Kittel, John Wiley & Sons, NJ, USA (2005).

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 and its 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 (CO)	Programme Outcomes (PO)
1. know principle, construction and working of lasers and their applications in various science and engineering	PO1, PO9
2. explain light propagation in optical fibers, types and their applications.	PO1, PO9
3. experience and appreciate the behavior of matter at atomic scale, and to impart knowledge in solving problems in modern science and engineering	PO1, PO7
4. understand the role of nuclear and particle physics in applications like radioactivity and nuclear reactions.	PO1
5. recognize, choose and apply knowledge to develop materials for specific applications for common needs.	PO1, PO7

COURSE PLAN – PART II			
COURSE OVERVIEW			
Same as course objectives			
COURSE TEACHING AND LEARNING ACTIVITIES			
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	9 Hours	Quantum Mechanics	Chalk and talk
4	9 Hours	Nuclear and Particle Physics	Chalk and talk / PPT
5	8 hours	Physics of Advanced Materials	Chalk and talk / PPT

COURSE ASSESSMENT METHODS (shall range from 4 to 6)				
S. No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	I Cycle Test	6th week	1 Hour	20
2	II Cycle Test	12th week	1 Hour	20
3	Assignment/Quiz	14th week	-	10
CPA	Compensation Assessment*	15th week	1 Hour	20
4	Final Assessment *	16th week	3 Hours	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 will be conducted through online (MIS) for self-assessment.

COURSE POLICY (including compensation assessment to be specified)

- Continuous assessment comprises two cycle tests and an assignment/quiz.
- Only one instance of absence in continuous assessment is permitted. Only one compensation assessment for absentees in continuous assessments will be conducted.
- Compensation assessment will be on the combined portions of two cycle tests.

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

- At least 75% attendance is mandatory. A maximum of 10% shall be allowed under On Duty (OD) / Medical Grounds.
- 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)

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

FOR APPROVAL

-sd-		
Dr.N.V.Giridharan		
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Course Faculty	CC-Chairperson	HOD