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UNIVERSITY OF PETROLEUM & ENERGY STUDIES

College of Engineering Studies

Dehradun

COURSE PLAN

Programme : B. Tech. [NON CIT Branches]

Course : Physics-I

Subject Code : PHYS-1001

No. of credits : 4

Semester : I

Session : 2017-18

Batch : 2017-21

Prepared by :

Email :

Approved By

HOD

UPES Campus

“Energy Acres”

P.O. Bidholi, Via Prem Nagar, Dehradun

Associate Dean

Tel : +91-135-2770137

Fax : +91 135- 27760904

Website : www.upes.ac.in



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COURSE PLAN

A. PREREQUISITE:

- a. Basic Knowledge of 10+2 physics.

B. PROGRAM OUTCOMES (POs) and PROGRAM SPECIFIC OUTCOMES (PSOs) for (Fill branch name):

B1. PROGRAM OUTCOMES (POs)

- PO1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2. Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO6. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO10. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and



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write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

C. COURSE OUTCOMES FOR PHYSICS: At the end of this course student should be able to

CO 1. Understanding the basic principle and working of lasers and its significance in holography and optical fiber communication.

CO 2. Comprehend the different types of crystal symmetries. The origin of X-rays and its applications in crystallography.

CO 3. Have a basic understanding of propagation characteristics of electromagnetic waves in vacuum as well as in materials systems.

CO 4. Understanding of the fundamental of acoustics and ultrasonic waves.

Table: Correlation of POs and PSOs v/s COs

PO/C O	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	1	1	1	1	-	-	-	-	-	-	-	-	-	-
CO2	2	1	1	1	1	-	-	-	-	-	-	-	-	-	-
CO3	2	1	1	1	1	-	-	-	-	-	-	-	-	-	-
CO4	2	1	1	1	1	-	-	-	-	-	-	-	-	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

D. PEDAGOGY

- **Presentation, White/Black Board, Videos**
- **flipped classroom session,**
- **think-pair and share,**

E. COURSE COMPLETION PLAN

Total Class room sessions	40
Total Test	04
Total Assignment	04
Total Tutorial classes	12

One Session=60 minutes



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F. EVALUATION & GRADING

Students will be evaluated based on the following 3 stages.

- | | | | |
|-----|----------------------|---|-----|
| 5.1 | Internal Assessment | - | 30% |
| 5.2 | Mid-term Examination | - | 20% |
| 5.3 | End term Examination | - | 50% |

F1. INTERNAL ASSESSMENT: WEIGHTAGE – 30%

Internal Assessment shall be done based on the following:

S.No.	Description	% of Weightage out of 30%
1	Class Tests	50%
2	Assignments (Problems/tutorials)	40%
3	Attendance and conduct in the class	10%

F2. Internal Assessment Record Sheet (including Mid Term Examination marks) will be displayed online at the end of semester i.e. last week of regular classroom teaching.

F3. CLASS TESTS/QUIZZES: Four Class Tests based on subjective/ Objective type questions & numerical questions will be held; two class test before the Mid Term Examination and remaining two class test before the End Term Examination. Those who do not appear in test examinations shall lose their marks.

Ist common class test: End of Aug 2017

IIInd common class test: End of Sep 2017

IIIrd common class test: End of Oct 2017

IIInd common class test: End of Nov 2017

The marks obtained by the students will be displayed on Black board a week before the start of Mid Term and End Term Examinations respectively.



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F4. ASSIGNMENTS (PROBLEMS/TUTORIALS): Tutorial classes will be conducted once in a week for developing problem solving and analyzing aptitude, based on topic covered in the theory classes. The marks based on performance will be displayed on Black board on monthly basis. After completion of each unit or in the mid of the unit, there will be home assignments based on theory and numerical problems. Those who fail to submit the assignments by the due date shall lose their marks.

F5. GENERAL DISCIPLINE: Based on student's regularity, punctuality, sincerity and behavior in the class. *The marks obtained by the students will be displayed on blackboard at the end of semester.*

F6. MID TERM EXAMINATION: WEIGHTAGE – 20%

Mid Term examination shall be Two Hours duration and shall be a combination of Short and Long theory Questions.

Date of showing Mid Term Examination Answer Sheets: Within a one week after completion of mid sem examination.

F7. END TERM EXAMINATION: WEIGHTAGE – 50%

End Term Examination shall be Three Hours duration and shall be a combination of Short and Long theory/numerical Questions.

F8. GRADING:

The overall marks obtained at the end of the semester comprising all the above three mentioned shall be converted to a grade.

G. COURSE DELIVERY PLAN

TOPICS/SUB TOPICS	NO. OF SESSIONS	Course Outcomes Addressed	Assignment(s)/Quizzes/ Tests
UNIT -1 <i>Introduction to wave optics:</i> Interference, Diffraction and Polarization	03	CO1	

<p>Laser: Spontaneous and Stimulated emission of radiation, Einstein's A and B coefficients, Population inversion & types of pumping, Properties of laser beam, Construction & working of Ruby and Helium-Neon laser and their application, Elementary idea of holography; construction and reconstruction of hologram</p>	05	CO1	Assignment – 1&2 Class Test – 1 &2
<p>Optical Fiber: Fundamental ideas about optical fiber, Types of fibers, Acceptance angle and cone, Numerical aperture, Propagation mechanism and communication in optical fiber</p>	04		
<p>UNIT-2 Crystal Structure and X Rays: Unit cell, Bravais Lattices, crystallographic planes, Miller indices, interplanar distance in cubic lattice, Calculation of number of atoms per unit cell, atomic radius, coordination number, packing factor for SC, BCC, FCC and HCP structures. Origin of X-rays, Continuous X-ray Spectra, Production of Characteristic X-Ray spectra, Moseley's law, X-ray diffraction and its applications in crystallography</p>	10	CO2	

UNIT-3 <i>Electromagnetic waves and propagation:</i> Displacement current, Maxwell’s correction in Ampere’s law, Maxwell’s Equations (Integral and Differential Forms) and Equation of continuity, EM-Wave equation and its propagation characteristics in free space and in dielectric and conducting medium, Poynting theorem and Poynting vectors.	8	CO3	Assignment – 3&4 Class Test 3&4
UNIT-4 <i>Acoustic and Ultrasonic waves:</i> Characteristics of sound, Classification of sound, Weber-Fechner Law, Sabine’s reverberation formula: rate of growth and decay of sound energy, Absorption coefficient and its determination, factors affecting acoustic of buildings and their remedies. Production of ultrasonic waves by magnetostriction and piezoelectric methods: acoustic grating, Detection of ultrasonic waves, properties of ultrasonic waves, Non Destructive Testing: pulse echo system through transmission and reflection modes: Applications	10	CO4	
Total no. of sessions	40		



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H. SUGGESTED READINGS:

G1. TEXT BOOK:

- T1: Engineering Physics by Neeraj Mehta, PHI Learning Pvt. Ltd., New Delhi
- T2: Modern Physics, By Aurthur Beiser ,TMHVith edition
- T3: Modern Engineering Physics by A. S. Vasudeva, S. Chand, New Delhi
- T4: Engineering Physics by Malik & Singh, TMH, New Delhi
- T5: Elements of Electromagnetics by M N O Sadiku, Oxford Press, Fourth Edition
- T6: Solid State Physics by S. O. Pillai

G2. REFERENCE BOOKS:

- R1: Feynman lectures of physics, Vol 1, Pearson Press, Fourth Edition
- R2: Introduction to Electromagnetics by D J Griffith, Addison-Wesley; Fourth Edition
- R3: Introduction of solid state physics by C.Kittle, Willey
- R4: Optics by Ajoy Ghatak, TMH, New Delhi

G3. OTHER RESOURCES

G4. VIDEO RESOURCES:

Available with Department of Physics

G5. WEB RESOURCES:

<http://www.hyperphysics.phy-astr.gsu.edu>

<http://www.ocw.mit.edu>

<http://www.youtube.com/physics>

<http://www.physicsweb.org>

<http://www.osa.org>



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GUIDELINES

Cell Phones and other Electronic Communication Devices: Cell phones and other electronic communication devices (such as Blackberries/Laptops) are not permitted in classes during Tests or the Mid/Final Examination. Such devices **MUST** be turned off in the class room.

E-Mail and online learning tool: Each student in the class should have an e-mail id and a pass word to access the blackboard system regularly. Regularly, important information – Date of conducting class tests, guest lectures, via online learning tool. The best way to arrange meetings with us or ask specific questions is by email and prior appointment. All the assignments preferably should be uploaded on online learning tool. Various research papers/reference material will be mailed/uploaded on online learning platform time to time.

Attendance: Students are required to have **minimum attendance of 75%** in each subject. Students with less than said percentage shall **NOT** be allowed to appear in the end semester examination.

Course outcome assessment: To assess the fulfilment of course outcomes two different approaches have been decided. Degree of fulfilment of course outcomes will be assessed in different ways through direct assessment and indirect assessment. In Direct Assessment, it is measured through quizzes, tests, assignment, Mid-term and/or End-term examinations. It is suggested that each examination is designed in such a way that it can address one or two outcomes (depending upon the course completion). Indirect assessment is done through the student survey which needs to be designed by the faculty (sample format is given below) and it shall be conducted towards the end of course completion. The evaluation of the achievement of the Course Outcomes shall be done by analyzing the inputs received through Direct and Indirect Assessments and then corrective actions suggested for further improvement.

Passing criterion: Student has to secure minimum 40% marks of the “highest marks in the class scored by a student in that subject (in that class/group class)” individually in both the ‘End-Semester examination’ and ‘Total Marks’ in order to pass in that paper.



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Sample format for Indirect Assessment of Course outcomes

NAME:
ENROLLMENT NO:
SAP ID:
COURSE:
PROGRAM:

Please rate the following aspects of course outcomes Physics-I.

Use the scale 1-4*

Sl. No.		1	2	3	4
1	CO 1. Understanding the basic principle and working of lasers and its significance in holography and optical fiber communication.				
2	CO 2. Explain the different types of crystal symmetries. The origin of X-rays and its applications in crystallography.				
3	CO 3. Have a basic understanding of propagation characteristics of electromagnetic waves in vacuum as well as in materials systems.				
4	CO 4. Understanding of the fundamental of acoustics and ultrasonic waves.				

S



Below Average



Average



Good



Very Good