**Annexure ‘CD – 01’**

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U T T A R P R A D E S H

**FORMAT FOR COURSE CURRICULUM**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **L** | **T** | **P/S** | **SW/FW** | **TOTAL CREDIT UNITS** |
| 3 | 0 | 2 | 2 | 5 |

# **Course Title:** **Engineering Physics**

**Course Code: PHYS132**

**Credit Units: 5**

**Level: UG**

**Course Objectives:** The aim of this course is to introduce the students about the fundamental concepts of under graduate level Physics and which forms the basis of all applied science and engineering disciplines.

**Pre-requisites: Nil**

**Course Contents/Syllabus:**

|  |  |
| --- | --- |
|  | **Weightage (%)** |
| **Module I: Wave Optics** | **35** |
| Coherent Sources, Conditions of Interference, Interference in thin films-parallel and Wedge shaped, Newton’s rings, Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at a Single Slit, and N Slits, Plane Transmission grating, Rayleigh criterion and Resolving power of grating,  Birefringence, Nicol prism, Production and Analysis of Plane, Circularly and Elliptically Polarized Light, Half and Quarter Wave Plates, Optical and Specific Rotation.  Introduction of Lasers, Induced Absorption, Spontaneous and Stimulated Emission, Einstein Coefficients, Population inversion, Concept of three and four level Lasers, Construction and Working of He-Ne and Ruby Laser. |
| **Module II: Electromagnetic Theory** | **25** |
| Scalar and Vector fields, Gradient, Divergence and Curl, Gauss’s and Stoke’s Theorems, Gauss’s Law in Electrostatics, Differential form of Gauss’s Law, Ampere’s Law, Displacement Current, Maxwell’s Equations in Free Space and Isotropic media, EM Wave Propagation in Free Space, Poynting theorem. |
| **Module III: Relativistic Mechanics** | **15** |
| Inertial and Non-inertial Frames, Postulates of Special Theory of Relativity, Lorentz Transformation, Length Contraction and Time Dilation, Addition of Velocities, Variation of Mass with Velocity, Mass Energy Equivalence. |  |
| **Module IV: Wave Mechanics** | **25** |
| Wave particle duality, De-Broglie Matter Waves, Phase and Group Velocity, Davisson Germer’s Experiment, Heisenberg Uncertainty Principle, Wave Function and its Physical Significance, Operators, Expectation Values, Time Dependent and Time Independent Schrödinger Wave Equation for Free and Bound States, Particle in a One Dimensional Potential Box.  Application of emerging Physics for engineers |

**Course Learning Outcomes:** After the completion of this course students will be able to:

1. Grasp the concepts of wave optics, electromagnetic theory, relativistic mechanics and wave mechanics (CLO1)
2. Understand the theory of wave optics, electromagnetic theory, relativistic mechanics and wave mechanics (CLO2)
3. Apply these fundamental concepts in various engineering applications (CLO3)
4. Analyze the fundamental equations of wave optics, electromagnetic theory, relativistic mechanics and wave mechanics (CLO4)
5. Evaluate qualitatively the problems or situations involving the application of the fundamental principles of physics to real world situations. ( CLO5)
6. Create real life solutions to the real life problems using the concepts of Engineering Physics ( CLO6)

**Pedagogy for Course Delivery:** The course pedagogy will follow the four quadrant approach i.e. using e-content like audio visual aids, video lectures, presentations, open source reference material, discussions on applications of topics covered. Assessment will be done through assignments, performance and viva/ quiz on topics covered after completion of modules.

**List of Professional Skill Development Activities (PSDA):**

* Laboratory skills
* Group discussion on some important topics
* Guest lecture by expert
* Group presentation on some important topics

**Lab/Practicals details, if applicable:**

**List of Experiments:**

1. To determine the wavelength of sodium light by Newtons’s rings method.
2. To determine the thickness of a given wire using wedge shape method.
3. To find angle of the prism and to determine the dispersive power of the material of prism with the help of a spectrometer.
4. To determine the specific rotation of sugar by Bi-quartz or Laurent half shade polarimeter.
5. To determine the width of a narrow slit using diffraction phenomena.
6. To determine the resistance per unit length of a Carey Foster’s bridge wire and also to find out the specific resistance of a given wire.
7. To determine the value of acceleration due to gravity (g) in the laboratory using bar pendulum.
8. To determine the acceleration due to gravity (g) by Kater’s reversible pendulum.
9. To determine the moment of inertia of a flywheel about its own axis of rotation.
10. To determine the frequency of an electrically maintained tuning fork by Melde’s method.
11. To find the wavelength of the prominent lines of mercury spectrum using plane transmission grating.
12. To determine the frequency of A.C. mains using sonometer and electromagnet.
13. To study the V-I characteristics of forward and reversed biased p-n junction diode.
14. To study the characteristics of a solar cell and find the fill factor.
15. To study the characteristics of a photo-cell and verify the inverse law of radiation.

**Assessment/Examination Scheme:**

|  |  |
| --- | --- |
| **Theory L/T/P/SW (%)** | **Lab/Practical/Studio (%)** |
| **80** | **20** |

**Theory Assessment (L/T/P/SW):**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Continuous Assessment/Internal Assessment (40%)** | | | | **End Term Examination (60%)** |
| **Components (Drop down)** | **Class Test** | **Assignment** | **Quiz 1/Quiz 2/Quiz 3** | **Attendance** | 60 |
| **Linkage of PSDA with**  **Internal Assessment**  **Component, if any** |  |  | **Quiz 3** |  |
| **Weightage (%) 80** | **10** | **10** | **5+5+5** | **5** |

**Lab/ Practical/ Studio Assessment:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Continuous Assessment/Internal Assessment (40%)** | | | | **End Term Examination (60%)** | |
| **Components (Drop down** | **Lab Record** | **Performance** | **Viva** | **Attendance** | **Experiment** | **Viva** |
| **Weightage (%) 20** | 10 | 10 | 15 | 5 | 30 | 30 |

**Texts and References:**

* Optics: A. K. Ghatak (Tata McGraw Hill Education Private Ltd., New Delhi)
* Optics: Brijlal and Subramanian (S. Chand)
* Principles of Lasers: A Svelto, V Edition (Springer)
* Optical Fiber and Laser: Anuradha De. (New Age International)
* Introduction to Electrodynamics: D. J. Griffith (Prentice Hall)
* Electrodynamics: Gupta, Kumar and Singh (Pragati Prakashan)
* Engineering Physics: Satya Prakash (Pragati Prakashan)
* Textbook of Engineering Physics: Part I, Neeraj Mehta (PHI Learning, Pvt. Ltd.)
* Textbook of Engineering Physics: Part II, Neeraj Mehta (PHI Learning, Pvt. Ltd.)
* Concept of Modern Physics: A. Beiser (Tata Mc-Graw Hill)
* Wave Mechanics: A. Goel (Discovery Publishing House, New Delhi)
* Practical Physics: C. L. Arora (S. Chand)

**Additional Reading:** Recent review articles and research papers on topics related to this course.

**Any other Study Material:** e-Content and Supplementary material available on LMS at Amizone.

**Mapping Continuous Evaluation components/PSDA with CLOs**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Bloom’s Level > | Remembering | Understanding | Applying | Analysing | Evaluating | Creating |
| Course Learning Outcomes  Assessment type/PSDA | CLO1 | CLO2 | CLO3 | CLO4 | CLO5 | CLO 6 |
| Class Test | √ | √ | √ | √ | √ | √ |
| Home Assignment | √ | √ | √ |  |  |  |
| Quiz 1 | √ | √ | √ | √ |  |  |
| Quiz 2 | √ | √ | √ | √ |  |  |
| Quiz 3 | √ | √ | √ | √ |  |  |
| Performance in Lab | √ | √ | √ | √ | √ |  |
| Lab Record | √ | √ | √ | √ | √ |  |
| Viva Voce | √ | √ | √ | √ | √ | √ |