

Unit I

Fundamental and derived quantities. Units and dimensions, dimensional analysis, order of magnitude, significant figures, errors. Reflection, refraction, diffraction, interference, scattering (elementary ideas only) – examples from daily life – apparent depth, the blue colour of the sky, twinkling of stars.

Total internal reflection, mirage, sparkling of diamond, Rainbow, Concave and convex mirrors, lenses – focal length, power of a lens, refractive index, prism, dispersion, Human eye.

Unit II

Velocity, acceleration, momentum, Idea of inertia, force - laws of motion. Newton's law of gravitation, acceleration due to gravity, mass and weight, apparent weight, weightlessness.

Unit III

Voltage and current, ohms law. Electric energy, electric power, microwave oven, transformer, generator, hydroelectric power generation – wind power – solar power – nuclear power

Unit IV

Planets, – solar system, moon, lunar and solar eclipses, Different types of stars, Galaxies, Satellites, Artificial satellites, Global positioning system.

References:

1. Fundamentals of Physics with Applications by Arthur Beiser
2. Conceptual Physics by Paul G Hewitt
3. D.S. Mathur, Elements of properties of matter and acoustics, S. Chand & Company Ltd., New Delhi (2010)
4. N. Subramaniam, Brijlal and M. N. Avadhanulu, A Textbook of Optics S. Chand & Co, New Delhi (2012).

240/PHY/MD202-A

Course ID - 240/PHY/MD202-A

RENEWABLE ENERGY AND SUSTAINABLE DEVELOPMENT

Marks (Theory): 50

Marks (Internal Assessment) : 25

Credits : 3 (45 lectures)

Time : 3 Hrs

Note: The paper setter is to set nine questions in all. Question no. 1 (compulsory based on the entire syllabus) will consist of five short answer type questions, each of two marks. The rest of the eight questions are to be set uniformly, with two questions from each unit selected. A student is required to attempt five questions, selecting one from each unit along with compulsory question no 1. The question paper shall contain 20% numerical problems in the relevant papers.

Course Objective: To introduce some concepts of reflection, refraction, interference, scattering, law of motion, hydroelectric power generation and universe for day to day applications.

Course Outcome: After completion of this course, students will be able to apply and visualize the laws of physics to everyday life.

Ranjit

Unit I

Fundamentals of Renewable Energy: Energy and sustainability, renewable Energy, requirement of energy transition from fossil fuels to renewable energy, types of renewable energy sources: solar energy, wind energy, hydropower, biomass and bioenergy, geothermal and tidal energy, Green Hydrogen advantages and limitations of each source, applications of renewable energy (mainly Solar energy)

Unit II

India's Renewable Energy Vision & the Road Ahead: India's Global Climate Commitments and leadership (Paris Agreement, COP26, G20, International Solar Alliance, OSOWOG), the energy transition: national goals and timelines, growth and trends in renewable energy in India deployment, Key terms (Watt, MW, GW, Grid, Off grid, Grid parity, net metering, carbon footprint) role of State governments and local bodies

Unit III

Stronger Grids, Smarter Energy: Green energy corridor, energy storage systems: 1) pumped hydro, 2) battery storage, 3) green hydrogen, smart grids and digital management, smart meters and demand side management (DSM)

Unit IV

Government Schemes and Policy Support for Renewable Energy: PM-KUSUM scheme, rooftop solar programme and surya ghar yojana, national green hydrogen mission, waste to energy and bioenergy promotion, off-grid Solar and decentralized applications, financial support: subsidies, loans, PLI scheme

References:

1. O.P. Chopra – नवीन और नवीकरणीय ऊर्जा स्रोत (Lakshmi Publications, Hindi)
2. B.L. Thapa – ऊर्जा के वैकल्पिक स्रोत (हिंदी ग्रंथ अकादमी, Bhopal, Hindi)
3. D.P. Kothari, K.C. Singal & Rakesh Ranjan – Renewable Energy and Environment (PHI Learning, New Delhi)
4. G.D. Rai – Non-Conventional Energy Resources (Khanna Publishers, New Delhi)
5. Annual Report, Ministry of New and Renewable Energy

Skill Enhancement Course

Course ID - 240/PHYP/SE201

BASICS OF PROGRAMMING

Max. Marks: 35

Internal Assessment: 15

Credit 2 (30Hrs)

Time: 3 hrs

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Raj

Unit II

Basics of Laser: Introduction to Stimulated and spontaneous emission introduction to LASER, Important properties of laser light, Principle of laser- Light amplification, population inversion and pumping; Working of laser- schematic diagram for functioning of laser, three level and four level Laser systems

Unit III

Introductory Quantum Mechanics: The wave equation, Postulates of quantum mechanics, Probability amplitude, Schrodinger equation in time-dependent form, Linearity and superposition, expectation values, operators, Schrodinger equation in time-independent form, Orthogonalization and normalization,

Unit IV

Application of Schrodinger wave equations: Particle in a box, Properties of wave functions, Particle in a finite potential well, Quantum tunneling process and its applications (Conceptual),

References:

1. Concept of Modern Physics by Arthur Beiser, McGraw Hill Education.
2. Modern Physics (2nd edition), by S.L. Kakani and Shubhra Kakani, Viva Books, New Delhi.
3. Semiconductor Devices - Physics and Technology by S.M. Sze, Wiley (1985)
4. Laser and Non-linear optics by B. B. Laud., Wiley Eastern Limited (1985)
5. Semiconductor Electronics by A. K. Sharma, New Age International Publisher (1996)

240/PHY/MD201-A

Multidisciplinary Course

Course ID - 240/PHY/MD201-A
PHYSICS IN EVERYDAY LIFE

Marks (Theory): 50

Marks (Internal Assessment) : 25

Credits : 3 (45 lectures)

Time : 3 Hrs

Note: The paper setter is to set nine questions in all. Question no. 1 (compulsory based on the entire syllabus) will consist of five short answer type questions, each of two marks. The rest of the eight questions are to be set uniformly, with two questions from each unit selected. A student is required to attempt five questions, selecting one from each unit along with compulsory question no 1. The question paper shall contain 20 % numerical problems in the relevant papers.

Course Objective: To introduce some concepts of reflection, refraction, interference, scattering, law of motion, hydroelectric power generation and universe for day to day applications.

Course Outcome: After completion of this course, students will be able to apply and visualize the laws of physics to everyday life.

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Course ID - 240/PHYP/MD202

RENEWABLE ENERGY AND SUSTAINABLE DEVELOPMENT

Marks (Theory): 50

Marks (Internal Assessment) : 25

Credits : 3 (45 lectures)

Time : 3 Hrs

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