



SYLLABI OF PHYSICS IDC PAPERS

SEMESTER-I

PHYIDC101T

PHYSICS IN DAILY LIFE

Contact Hours: 45

Full Marks = 100 [ESE (70) CCA (30)]

***Course objective:** This course is intended for students of disciplines other than Physics. Through this course, students can understand their surroundings by understanding the basic rules of Nature and able to connect some daily life observations to Physics and Biophysics principles.*

Unit 1: Quantities, Energy and Power

Physical quantities, Standards and Units, International system of Units, Standards of time, length and mass, Precision and significant figures, errors. Energy and Power: Explosions and energy; Kinetic energy and conservation of momentum in explosions; Different types of Energy: Renewable and non-renewable, Heat energy and its units; Energy table and discussions; Discussion of cost of energy; Measuring energy; Power; Different power sources. **(10 Lectures)**

Unit 2: Gravity and Force

The force of Gravity; Friction; its advantages and disadvantages, Bending of cyclist and banking of roads; Weightlessness; Geosynchronous satellites; Spy satellites; weather satellites, Rockets; Airplanes, helicopters; Hot air and helium balloons. Ice skater spin and planet orbiting around sun (application of conservation of angular momentum). Swing of cricket ball (application of Bernoulli's theorem). **(8 Lectures)**

Unit 3: Commonly used appliances and devices

Basic understating and application of common appliances in daily life: Pressure cooker, Water purifiers: UV & RO, Electric motors, fans, Sound system, microphones, micro-ovens, refrigerators, air conditioners, Music Player, Electronic displays (LCD and LED), digital / smart watches, mobile phones, computers. **(8 Lectures)**

Unit 4: Vision, sound and radiation

Radioactivity; Elements and isotopes; Radiation and rays; The radiation poisoning; Medical applications of radiation.

Vision: Visible light spectra; concept of colour, vision defects. Hearing: Sound waves and hearing, sound intensity; the decibel scale, Noise Pollution. Acoustics of building and auditorium. **(10 Lectures)**



Unit 5:

Bio-imaging: Ultrasound, MRI imaging, CT scan and X-ray.

Radiation effect on biological systems: High doses received in a short time, Low-level doses limits, direct ionization of DNA, radiation damage to DNA, Biological effects (Genetic, Somatic, Cancer and sterility). **(9 Lectures)**

Expected learning outcomes: At the end of this course the students are expected to connect their surroundings by understanding the basic rules of Nature and able to connect some daily life observations to Physics principles. Moreover, this course expects students to have some ideas on various commonly used appliances and various Bio-imaging techniques which in inevitable for present day therapeutics.

Reference Books:

- i. Physics for future presidents by Richard A. Muller.
- ii. Nuclei and Radioactivity by G.R. Choppin (W. A. Benjamin, N.Y. York).
- iii. Space, Time and Gravitation by A.S. Eddington (Cambridge University Press).
- iv. S. S. Martellucci and A. N. Chester, Laser Photobiology and Photomedicine, Plenum Press, New York, 1985.
- v. The Casual Sky Observer's Guide by Rony De Laet Springer 2012.
- vi. Fundamentals of Physics with Applications (Schaum's Outline Series) by Arthur Beiser.
- vii. Essentials of Biophysics: P. Narayanan, New age international publisher, 2009.
- viii. A Text Book of Biophysics, R.N. Roy, New Central Book Agency (P) Ltd. 2005 Edition.