GUJARAT UNIVERSITY
Syllabus for Second Year B.Sc.: Semester – III
Effective from June 2024
MDC-PHY-234T (2 Credit)
Astrophysics and Nuclear Physics

Learning Objectives

To enable learners to

- understand basic tools of observational techniques in Astrophysics
- study various types of nuclear detectors

Learning Outcomes

On successful completion of the course, the learners would gain the knowledge of

- different types of telescopes, astronomical spectrographs and about the magnitudes, motion and distance of stars
- interaction between the particles and matter and get insight for the various detectors used in nuclear and particle physics

UNIT – I: ASTROPHYSICS **[15 Hours]**

Astronomical Instruments

Light and properties, The Earth's atmosphere and the electromagnetic radiation, Optical telescopes, Radio telescopes, The Hubble space telescope, Astronomical spectrographs, Photographic photometry

Magnitudes, Motions and Distances of Star

Stellar magnitude sequence, Absolute magnitude and distance modulus, The bolometric magnitude, Different magnitude standards: The UBV system and six colour photometry, Radiometric magnitudes, The colour index of a star, Luminosities of stars, Stellar parallax (Trigonometric) and the units of stellar distances, Stellar positions: The stellar coordinates, Stellar motions

Reference Book:

1. An Introduction to Astrophysics by Baidyanath Basu, Tanuka Chattopadhyay and Sudhindra Nath Biswas, 2nd edition, PHI Learning private limited.
Articles: 1.1 to 1.7; 3.1 to 3.10

2. Astrophysics for Physicists by Arnab Rai Choudhuri Cambridge university press, 2010.

UNIT – II: NUCLEAR PHYSICS [15 Hours]

Physical Tools

Introduction, Interaction between particles & Matter, brief survey, Detectors for Nuclear particles (i) Proportional counter (ii) The Geiger counter (iii) Scintillation counter (iv) Solid state or semi-conductor detectors (v) Cloud & Bubble chambers (vi) Spark chamber

Particle Accelerators

Need for an accelerator of charged particles, (i) Van de Graff Generator (ii) The cyclotron (iii) Synchrotron (iv) The Betatron; Beta ray spectrometer

Reference book:

1. Nuclear physics, An introduction by S. B. Patel, New Age International (P) Ltd. Article Nos.: 1.1.1 to 1.1.5
2. Nuclear Physics by D.C. Tayal, Himalaya Publishing House.

GUJARAT UNIVERSITY
Syllabus for Second Year B.Sc.: Semester – III
Effective from June 2024
MDC-PHY-234P (2 Credit)
General Physics and Optics
[60 Hours]

Course objectives

To enable the learners to

- understand the physical phenomena and fundamentals of general Physics
- perform experiments in the field of general Physics

Course outcome

After successful completion of course learners will

- develop the ability to analyse the basic experiment
- conduct experimental investigation on mechanical and optical Physics
- practice recording of experimental work and data graphing

1. Y-by Koening's method.
2. Wavelength of prominent spectral lines by diffraction grating.
3. Resolving power of telescope.
4. Wavelength of light using Hartmann formula.
5. Study of electron diffraction pattern.
6. To understand the excel for data analysis and graph plotting.
7. Study of X ray diffraction.
8. Cauchy constant.
9. Thickness of wire using optical bench.
10. To find the Planck's constant using LED
11. Characteristics of solar cell
12. Fourier Analysis

Reference book:

1. Advanced practical physics for students by Worsnop and Flint
2. B. Sc. Practical Physics by C. L. Arora; S. Chand Publication
3. Practical Physics by G. L. Squires.
4. Practical Physics by Gupta and Kumar; Pragati Prakashan