

Syllabi & evaluation norms for Part-III courses

Co-ordinating Department : Department of Physics

**SEC III – VALUE ADDED COURSE
ANY SEMESTER BETWEEN II to V**

16UPHVA01	Instrument calibration & Maintenance	40 Hrs	01 Credits
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Objectives:

1. To familiarise the students with different instruments like spectrophotometer, Audio Frequency oscillators, PH meter, PCR machine, Incubator. Conductivity meter, Polari meter etc.
2. To understand importance of calibration for measuring instruments.
3. To develop understanding among the students for the functioning and applications of the various instruments.

Unit 1 : SPECTROPHOTOMETER (05 hrs)

- Introduction to spectrophotometer and types of spectrophotometer
- Calibration requirements, Types of Calibration
- Maintenance
- Spectrophotometer applications, Structure identification
- To study rate of reaction, Determination of dissociation constant

Unit 2 : AUDIO FREQUENCY OSCILLATORS (AFO) (05 hrs)

- Introduction, Principle and working AFO
- Types of audio frequency oscillators, Calibration methods
- Specification of AFO, Frequency range, Control, Accuracy
- Distortion and noise level, Synchronization
- Applications of AFO

Unit 3 : INCUBATOR (05 hrs)

- Introduction, Principle and working, Calibration methods
- Quality control and maintenance
- Applications, Growth and storage of bacterial cultures, Biochemical and haematological studies
- Pharmaceutical work and food analysis, Genetic engineering
- To create new organism, To make insulin and other essential biological proteins, to improve nutritional content of fruits.

Unit 4 : PCR MACHINE (05 hrs)

- Introduction, Construction and working
- Calibration methods, maintenance
- Sample Acquisition and Preparation
- Applications of PCR machine genetic testing, Prenatal testing
- Forensic applications, to understand genetic fingerprinting

Unit 5 : PH METER (05 hrs)

- Introduction, construction and working
- Calibration and maintenance
- Types of PH meter
- Application of PH meter, Chemical laboratory work
- Soil measurement in agriculture, measurement of water quality for water supply system

Unit 6 : DIGITAL POTENTIO METETR (05 hrs)

- Introduction, construction and working
- Calibration and maintenance
- Stability, Precision and accuracy in digital potentio meter
- Application of digital potentio meter, Chemical laboratory work
- Computer connectivity and software understanding

Unit 7 : DIGITAL CONDUCTIVITY METER (05 hrs)

- Introduction, construction and working
- Calibration and maintenance
- Auto temperature in conductivity meter
- Application of digital conductivity meter, Chemical laboratory work
- Computer connectivity and software understanding

Unit 8 : DIGITAL POLARTI METER (05 hrs)

- Introduction, construction and working
- Calibration and maintenance
- Application of Polari meter, Chemical laboratory work
- Computer connectivity and software understanding

Reference Books:

1. J Michael Hollas, Modern Spectroscopy, Wiley publication.
2. John H Moore, Building Scientific instruments, Cambridge university press.
3. Degen, PCR applications manuals 3rd edition.
4. Stephen A Busin, A to Z of Quantitative PCR , Intl Univ line