

DEPARTMENT OF PHYSICS
VALUE ADDED COURSE
PHYSICS LABORATORY INSTRUMENTS AND THEIR TROUBLE
SHOOTING

Hours : 30

Course outcome:

At the end of this course, students will be able to

CO.1. Well acquaintance with fundamental theoretical aspect of Basic elements of electronics and its measuring devices, measurement standard.

CO.2. Enlightened various electronic components practical utility and its trouble shootings

CO.3. Understood logical circuit elements and few of its applications

CO.4. Could pursue higher study on electronic specialisation

CO.5. Familiarised themselves with the basic functioning electronic circuits in home appliance

Unit – I: Measurement Standards

6 hrs

Classification of standards – standard of mass, length and volume – Time and frequency standards – Electrical standards – The Absolute ampere and voltage standards – standards for Temperature and luminous intensity - IEEE standards.

Unit – II: Passive circuit elements

6 hrs

Resistors – types - power rating – value tolerance – variable resistors – potentiometers and Rheostats – resistor color codes – resistance color bands – checking of resistor with an ohmmeter – capacitors – capacitance – factors controlling capacitance – capacitor types – ceramic and electrolyte – voltage rating of capacitors – troubles in capacitors – checking capacitors with ohmmeter.

Unit – III: Semiconductor devices and Transformers

6 hrs

Diode – Diode Ratings or Specifications – diode testing – the real diode – the bipolar junction transistor (PNP and NPN) – transistor fault location.

Transformers - Transformer types – Action to be taken if the oil temperature rises unduly – the qualities of good transformer oil – Breakdown Voltage (BDV) for the oil – Action to be taken if a transformer fails.

Unit –IV: Analog Instruments

6 hrs

Introduction – Functions of instruments – Essential ideas of electronic instruments – Characterization of moving coil meter movement – variation of basic meter movement – multirange meter - Energy meters – Induction motor meter - CRO - Normal operation of CRO – frequency determination with Lissajous figures – Applications of a CRO.

Unit-V: Digital Circuits**6 hrs**

Bread board connection – pin configurations of basic logic gates ICs 74XX – Testing ICs with digital board and power supply (transformer stage, rectifier stage, filter stage) – combining logic gates: To design 4-bit equality comparator and one-bit magnitude comparator – BCD (8421) to seven segment display decoder.

Books for Reference:

1. B.L. Thereja, Basic Electronics Solid State , S Chand and Company, 2008.
2. V.K. Mehta, Rohith Metha, Principles of Electrical Engineering, S Chand, 2009.
3. Albert D. Hlfrick and William Cooper, Modern electronic instrumentation and measurement Techniques, EEE publication, 1999.
4. B.V. Narayan Rao, Principles of Electronics, (Vol 1) Wiley Eastern Limited, 1993.

VALUE ADDED COURSE

SPACE PHYSICS

Course Outcomes:

At the end of this course, students will be able to

- CO.1. Introduced essential theoretical knowledge of space, its various constituent and devices for its observations
- CO.2. Acquired the basic knowledge of our Solar systems
- CO.3. Enlightened various kind of telescope and its significant properties
- CO.4. Outlined different types of satellite and its launching vehicle.
- CO.5. Updated the role of ISRO in space science

Unit-I: Universe

6 hrs

Mass, length and time scales – celestial co-ordinates – sources of astronomical information – Galaxies – Hubble's law – Red shift – Measurement of the distance and the age of universe.

Unit-II: Solar systems

6 hrs

Solar system – Sun – Physical properties of earth – Small bodies in solar systems :- Asteroids, Meteorites, comets, meteoros.

Unit-III: Telescope

6 hrs

Astronomical Telescopes (concept only):- Refracting Telescope, Reflecting Telescope, Radio Telescope, IR Telescope – Features of Good Telescopes: Light gathering power, Resolving Power and Magnification.

Unit-IV: Rocket and Satellite

6 hrs

Multistage Rockets – Launching vehicles – Satellites:- INSAT series – GSAT – PSLV series – Remote Sensing Satellites (Basic principles only)

Unit-V: Space Program in India

6 hrs

ISRO – origin – goals and objectives – Extra terrestrial exploration – Chandrayan 1 – Mangalyan.

Books for Reference:

1. Arnab Rai Choudhri, Astrophysics for Physicists, First Edition, Cambridge University Press, 2010.
2. Brijlal and Subramanyam, Properties of Matter, Third Edition, Eurasia publishing House, 1996.