

UNIVERSITY OF MADRAS
U.G. DEGREE COURSES
SYLLABUS WITH EFFECT FROM 2020-2021

BPS-CSA02

ALLIED PHYSICS-II (THEORY)

(For B.Sc., Mathematics, Chemistry and Computer Science students)

Lecture:60 Hours

Tutorial:15 Hours

Credits:3

Course Objective:

- This paper introduces the student to the basic concepts of current electricity, electronics and digital electronics.

Learning Outcome:

- Acquire knowledge on elementary ideas of electricity and magnetism
- Emphasize the significance of laws involved in electric circuits
- Understand the basics of operational amplifier
- Apply the principles of electronics in day to life
- Apply the characteristics of electronic devices in practicals.

UNIT I: Current Electricity

Ohm's law – Law of resistance in series and parallel – Specific resistance – capacitors – capacitors in serial and parallel – Kirchoff's laws – Wheatstone's network – condition for balance

Carey-Foster's bridge – measurement of resistance – measurement of specific resistance – determination of temperature coefficient of resistance – Potentiometer – calibration of Voltmeter.

UNIT II: Electromagnetism

Electromagnetic Induction – Faraday's laws – Lenz law – Self Inductance – Mutual Inductance – Experimental Determination-Coefficient of Coupling

A.C. Circuits – Mean value – RMS value – Peak value – LCR in series circuit – impedance – resonant frequency – sharpness of resonance.

UNIT III: Atomic and Nuclear Physics

Bohr's atom model – radius energy – Atomic excitation – Ionization potential – Frank and Hertz Method – Nucleus – Nuclear properties – Mass defect – Binding energy.

Radio isotopes – Uses of radio isotopes – Nuclear fusion and Nuclear fission – X-rays – Production – properties – Derivation of Bragg's law – uses of X-rays in industrial and medical fields.

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UNIT IV: Analog Electronics

Semiconductor – PN junction diode – Bridge rectifier – Zener diode – Regulated power supply.
Transistor – Working of a transistor – Transistor characteristics: CE Configuration – current gain relationship between α and β – Transistor Characteristics – CE Configuration only – CE amplifier – feedback – Hartley oscillator – Colpitt's oscillator.

UNIT V: Digital Electronics

Number system – Decimal – Binary – Octal and Hexadecimal system – Double Dabble method – Binary addition, subtraction and multiplication– conversion of binary number to octal and hexadecimal numbers and vice versa.

Logic gates – OR, AND, NOT, XOR, NAND and NOR gates – truth tables – Half adder and Full adder circuits – Laws and theorems of Boolean's algebra – De Morgan's theorems.

BOOKS FOR STUDY:

1. Electricity and Magnetism – R. Murugesan, S. Chand & co, 2001.
2. Modern Physics – R. Murugesan, S. Chand & co, 1998.
3. Basic Electronics – B.L. Theraja, S. Chand & co, 2003.