

Course Name : **Electronics**
Course Number : **PH 514**
Credits : **4-0-0-4**
Prerequisites : **Undergraduate physics courses and faculty consent**
Intended for : **PG**
Distribution : **Core for I-Ph.D. and elective for others**
Semester : **Odd**

Preamble : To understand the principle of analog and digital electronics.

Course Outline : The course begins with analog electronics involving study of amplifier, oscillators, field effect transistor and operation amplifiers. Then the concept of Boolean algebra and digital electronics is introduced. Consecutively various digital circuits like combinational, clock and timing, sequential and digitally integrated circuit are studied. Further the course will introduce microprocessor.

Modules :

Amplifiers: BJT, Classification of Amplifiers, Cascading of amplifiers, Types of power amplifiers, Amplifier characteristics, Feedback in amplifiers, Feedback amplifier topologies, Effects of negative feedback [11 lectures]

Oscillators and Multivibrators: Classification and basic principle of oscillator, Feedback oscillators concepts, Types of oscillator, Classes of multivibrators [4 lectures]

Field effect transistors: JFET, Static characteristics of JFET, FET parameters, FET oscillators, MOSFET, Static characteristics of MOSFET [3 lectures]

Operational amplifiers: OPAMPs, OPAMP applications [3 lectures]

Boolean Algebra and Digital circuit: Binary numbers, Interconversion between decimal, binary, hexadecimal number system, Boolean algebra, De Morgan's theorem, Logic Gates, Karnaugh Maps, [7 lectures]

Combinational circuits: Adder, Multiplexer, Demultiplexer, Encoder, Decoder [5 lectures]

Clock and timing circuit: Clock waveform, Schmitt Trigger, 555 Timer-Astable, Monostable [3 lectures]

Sequential circuits: Flip-Flops, Registers, Counters, Memories, D/A and A/D conversions [11 lectures]

Digital integrated circuits: Switching circuit, TTL, CMOS [3 lectures]

Microprocessor Basics: Introduction, Outline of 8085 processor, Data analysis [4 lectures]

Text Books:

- 1) Integrated electronics by Millman and Halkias (McGraw-Hill, 2001)
- 2) Electronic Principles: A. P. Malvino and D. P. Bates (7th Edn) McGraw-Hill (2006)
- 3) Digital Principles and Applications: D. P. Leach, A. P. Malvino and G. Saha, (6th Edn), Tata McGraw Hill (2007)
- 4) Digital Electronics-Principles, Devices and Applications: A. K. Maini John Wiley & Sons (2007)
- 5) R. S. Gaonkar, Microprocessor Architecture: Programming and Applications with the 8085, Penram India (1999).