



## **M1PHY04-CT04: Electronics**

External: 80 Marks

Internal: 20 marks

Lectures: 40hrs

Tutorials : 10 hrs

Additional Contact Hours: 10 (seminars, quiz, assignments, group discussion etc.)

### **UNIT-1**

#### **Amplification: Operational Amplifiers-I (8L)**

Differential amplifier: circuit configurations, dual input, balanced output differential amplifier, DC analysis and AC analysis, inverting and non inverting inputs, Block diagram of typical OP-Amplifier, Constant current-bias level translator. Open loop configuration, inverting and non-inverting amplifiers, and Frequency- response.

OP-Amp Parameters: input offset voltage, bias currents, input offset current, output offset voltage, CMRR, frequency response, Slew rate. OP-Amp with negative feedback, voltage series feedback, effect of feed-back on closed loop gain, input and output resistance, band width.

### **UNIT-II**

#### **Operational Amplifiers based Instrumentations and their applications (3L):**

DC and AC amplifier, voltage follower, Adder, subtractor, multiplier, phase changer, Active filters, Active Integrator and active differentiator.

#### **Oscillators and wave shaping Circuits (5L)**

Oscillator Principle - Oscillator types, Frequency stability response, the phase shift oscillator, Wien bridge oscillator, LC tunable oscillators, Multivibrators: Monostable and Astable, Comparators, Square and triangle wave form generators.



## **UNIT-III**

### **Voltage regulators (3L)**

Block diagram of Power supply, fixed voltage regulators, adjustable voltage regulators, switching regulators. Clipping and clamping circuits.

Boolean algebra and logic gates (4L): Canonical and standard forms, IC logic families, Simplification of Boolean functions: Karnaugh map of up to 4 variables, don't care conditions, NAND and NOR implementation

### **Combinational logic (4L)**

Adders, subtractors, binary parallel adder, magnitude comparator, decoders/ Demultiplexers encoders/multiplexers.

## **UNIT-IV**

**Sequential Logic (5L):** Basic flip-flop, clocked RS flip-flop, T flip-flop, D flip-flop, J-K flip flop, triggering of flip-flops, JK master slave flip-flops; Synchronous and asynchronous counters: Binary counters, Decade counters, Registers

### **Microprocessors (3L):**

Organization of a Micro computer based system, Microprocessor architecture and its operations, Memory, memory map. The 8085 microprocessor unit; Functional block diagram.

## **UNIT-V**

### **Assembly Language Programming of 8085 (8L):**

Instruction set of 8085: Data transfer operations, Arithmetic operations, Logic operations, Branch operations, Addressing modes of 8085 instructions, Assembly language programmes involving data transfer, arithmetic logic operations and looping, counting and indexing - counters and timing delays.



## **Tutorials (10T hrs)**

Review of basic electronics: Currents in a transistor, Design of CE and CC Amplifier, Design of two stage amplifier. In addition to the above, problems from the reference books can be given as assignments to the students.

## **Reference Books:**

1. "Integrated Electronics", by J. Millman and C.C. Halkias, TMH, New Delhi
2. "OP-AMP and Linear Integrated Circuits" by Ramakanth, A. Gayakwad, PHI, New Delhi
3. "Electronic Devices and Circuit Theory" by Robert Boylestead and Louis Nashelsky, PHI, New Delhi – 110001
4. "Digital Logic and Computer design" by Electronics by Morris Mano
5. "Digital Principle and Applications" by A.P. Malvino and Donald P. Leach, TMH, New Delhi.
6. "Microprocessors Architecture, Programming and Applications with 8085/8086" Ramesh S Gaonkar, Wiley - Eastern Ltd.