

## 2/4 B.Tech - SECOND SEMESTER

EC4T2

Pulse & Digital Circuits

Credits: 3

Lecture: 3 periods/week

Internal assessment: 30 marks

Tutorial: 1 period /week

Semester end examination: 70 marks

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**Pre-requisites:** Electronic Devices & Circuits (EC 2T5)

### Course Objectives:

- To introduce the fundamental concepts of the wave shaping
- To analyze different types of Multivibrators and their design procedures
- To familiarize the operation of Time-base Generators and logic families

### Learning Outcomes:

Student will be able to

- Solve the problems on wave shaping circuits
- Design the Multivibrator circuits as per the specifications
- Classify and explain time base generators and logic families

### UNIT- I

**Linear Wave Shaping:** Operation of High pass and Low pass RC circuits, Response of High pass and Low pass RC circuits to sinusoidal, step, pulse, square, exponential and ramp inputs, High pass RC circuit as a differentiator, Low pass RC circuit as an integrator.

### UNIT- II

**Nonlinear Wave Shaping:** Clipping operation, Series & Shunt Diode clippers, Clipping at two independent levels, analysis of multi-diode clipping circuits, clamping operation, Positive and Negative clampers, biased clampers, steady state response of the clamping circuit to a square wave input, Clamping circuit theorem.

### UNIT- III

**Bistable Multivibrators:** Design and Analysis of Fixed-bias& self-bias transistor binary, Commutating capacitors, Triggering of Binary, Non saturating Binary, Transistor Schmitt trigger and its applications.

### UNIT- IV

**Monostable &Astable Multivibrators:** Collector coupled Monostable multivibrator-expression for the gate width, waveforms at bases and collectors; Collector coupled Astable multivibrator-expression for the frequency of operation, waveforms at bases and collectors, voltage to frequency convertor; design and analysis related problems on those circuits.

**Logic families:** DTL, TTL, ECL, MOS and CMOS logic families, Realization of NAND & NOR gates.

## UNIT- V

**Sweep Circuits:** General features of a time-base signal, Exponential voltage sweep circuit, basic principles of Miller and Bootstrap time-base generators, transistor Miller voltage sweep generator, transistor bootstrap voltage sweep generator, simple current sweep circuit, linearity correction through adjustment of driving waveform, transistor current time base generator.

### Learning Resources

#### Text Books:

1. Pulse Digital and Switching Waveforms, J. Millman and H. Taub, McGraw-Hill, 2<sup>nd</sup> Edition 1991.
2. Pulse and Digital Circuits, A. Anand Kumar, PHI, 2nd Edition, 2005.

#### References:

1. Digital Logic State Machine Design, David J.Comer Oxford University Press, 3rd Edition, 2008
2. Introduction to System Design Using Integrated Circuits, B S Sonde, New Age International, 2nd Edition, 1992.
3. David A Bell, “Solid State Pulse Circuits”, Prentice Hall Inc, Fourth Edition, 2005.

#### Web Resources:

1. [http://notes.smartzmail.com/wp-content/uploads/2013/10/PDC\\_Notes.pdf](http://notes.smartzmail.com/wp-content/uploads/2013/10/PDC_Notes.pdf)
2. <http://jntufiles.com/2014/12/13/pulse-digital-circuits-textbook-free-download/>
3. [http://ftp.utcluj.ro/pub/users/dadarlat/circ\\_analognumeric-calc/curs8-eng.pdf](http://ftp.utcluj.ro/pub/users/dadarlat/circ_analognumeric-calc/curs8-eng.pdf)
4. <http://www.talkingelectronics.com/Download%20eBooks/Principles%20of%20electronics/CH-18.pdf>