PULSE AND DIGITAL CIRCUITS

IV Semester: ECE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AEC006	Foundation	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

I. COURSE OVERVIEW:

This course provides circuit analysis to design high frequency amplifiers and wave shaping circuits using discrete components. It covers on multistage amplifiers, power amplifiers, feedback concepts, sampling gates and multivibrators. Analog electronics are widely used in radio and audio equipment and in many applications where signals are derived from analog sensors and transducers.

II. OBJECTIVES:

The course should enable the students to:

I. Be proficient in the use of linear and nonlinear wave shaping circuits for sinusoidal, pulse and ramp inputs
II. Construct various multivibrators using transistors, and design sweep circuits and sampling gates.
III. Evaluate the methods to achieve frequency synchronization and division using the uni-junction transistors, multivibrators and symmetric circuits.
IV. Realize logic gates using diodes and transistors and distinguish between various logic families.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

CO 1	**Analyze** the response of linear and non-linear wave shaping circuits for impulse and pulse inputs with different time constants.	Analyze
CO 2	**Build** bistable, monostable & astable multivibrator circuits using transistors for real time applications.	Apply
CO 3	**Apply** the operating principles of diodes and transistors for the designing of sampling gates.	Apply
CO 4	**Illustrate** different methods to generate time base waveforms using Bootstrap and Miller circuits.	Understand
CO 5	**Understand** the synchronization and frequency division concepts using relaxation devices and sweep circuits.	Understand
CO 6	**Summarize** the characteristics of digital logic families for designing of digital logic circuits.	Understand

IV. SYLLABUS:

UNIT-I	WAVE SHAPING CIRCUITS	Classes: 10

Linear wave shaping circuits: High pass RC and low pass RC circuits, response to impulse and pulse inputs with different time constants, high pass RC circuit as a differentiator, low pass RC circuit as an integrator, switching characteristics of diode; Non-linear wave shaping circuits: Clipping circuits, diode clippers, shunt clippers, series clippers, clipping at two independent levels; Clamping circuits: Clamping theorem.

UNIT-II	MULTIVIBRATORS	Classes: 10

Multivibrators: Introduction, classification; Bistable multivibrator: Fixed bias, self bias, unsymmetrical triggering, symmetrical triggering; Schmitt trigger: Upper trigger point, lower trigger point, hysteresis, applications of schmitt trigger; Monostable multivibrator: Collector coupled, triggering of monostable multivibrator; Astable multivibrator: Collector coupled, voltage to frequency converter.

UNIT-III	SAMPLING GATES AND TIME BASE GENERATORS	Classes: 08

Sampling gates: basic operating principle of sampling gate, uni and bi directional sampling gates.

Time base generators: General features of a time base signal; Methods of generating a time base waveform: Exponential sweep circuits, sweep circuit using uni junction transistor, Miller sweep circuit and Bootstrap sweep circuit.

UNIT-IV	SYNCHRONIZATION AND FREQUENCY DIVISION	Classes: 09

Synchronization and frequency division: Pulse synchronization of relaxation devices, frequency division with sweep circuits, other astable relaxation circuits, synchronization of astable multivibrator, monostable relaxation circuits as dividers, stability of relaxation dividers; Synchronization of a sweep circuit with symmetrical signals: Sinusoidal synchronization signals and sine wave frequency division with a sweep circuit.

UNIT-V	DIGITAL LOGIC FAMILIES	Classes: 08

Bipolar logic families: RTL, DTL, DCTL, HTL, TTL, ECL, MOS, and CMOS logic families, tristate logic; Interfacing of CMOS and TTL families.

Text Books:

1. Millman J., Taub, "Pulse, Digital and Switching Waveforms", Tata McGraw-Hill, 2nd Edition, 2007.
2. David A. Bell, "Solid State Pulse circuits", PHI learning, 4th Edition, 2002.
3. David J.Comer, "Digital Logic State Machine Design", Oxford University Press, 3rd Edition, 2008.

Reference Books:

1. Ronald J. Tocci, "Fundamentals of Pulse and Digital Circuits", PHI learning, 3rd Edition, 2008.
2. A. Anand Kumar, "Pulse and Digital Circuits", PHI learning, 2nd Edition, 2005.

Web References:

1. www.nptel.ac.in
2. notes.specworld.in/pdc-pulse-and-digital-circuits
3. surkur.blogspot.in/p/pdc.html
4. https://books.google.co.in/books?isbn=8131721353

E-Text Books:

1. http:// www.introni.it/pdf/Millman-Taub- Pulse and Digital Switching Waveforms 1965.pdf
2. https://www.jntubook.com/pulse-digital-circuits-textbook-free-download/

Course Home Page: