Program : **Diploma in Electronics/ Electronics and Communication Engineering/ Biomedical Engineering**	
Course Code : **3043**	Course Title: **Electronic Circuits**
Semester : **3**	Credits: **4**
Course Category: **Program Core**	
Periods per week: **4 (L:3, T:1, P:0)**	Periods per semester:**60**

Course Objectives:

- To enable the students to design various types of amplifiers and study its characteristics.
- To familiarize the design and applications of different types of sinusoidal and non sinusoidal oscillators.

Course Prerequisites:

Topic	Course code	Course Title	Semester
AC signal representation, Power, rms values, peak values., passive components		Fundamentals of Electrical and Electronics Engineering	2
Semiconductor theory, diodes, and transistors		Basic Electronics	2
Basic Engineering Mathematics principles and theorems		Mathematics I, II	1 & 2

Course Outcomes:

On completion of the course, thestudent will be able to:

COn	Description	Duration (Hours)	Cognitive Level
CO1	Develop basic single stage and multistage amplifiers	14	Applying
CO2	Develop basic tuned amplifiers and power amplifiers.	15	Applying
CO3	Develop feedback amplifiers and Sinusoidal Oscillators	15	Applying
CO4	Make use of transistors to realize various pulse and switching circuits.	14	Applying
	Series Test	2	

CO-PO Mapping:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3						
CO2	3						
CO3	3						
CO4	3						

3-Strongly mapped, 2-Moderately mapped, 1-Weakly mapped

Course Outline:

Module Outcomes	Description	Duration (hours)	Cognitive Level
CO1	**Develop basic single stage and multistage amplifiers**		
M1.01	Explain transistor biasing and different biasing circuits.	3	Understanding
M1.02	Develop single stage CE amplifier with voltage divider biasing and obtain its parameters.	4	Applying
M1.03	Summarize the features and applications of emitter follower.	1	Understanding
M1.04	Develop multistage amplifiers with different coupling schemes.	3	Applying
M1.05	Illustrate the frequency responses of multistage amplifiers.	2	Understanding
M1.06	List the applications of multistage amplifiers.	1	Remembering
Contents: **Transistor biasing** – need - load line – operating point – stabilization of operating point - Biasing circuits – requirements - list - fixed and voltage divider bias circuits. **Single Stage CE Amplifier** with voltage divider biasing - principle of operation - expression for voltage gain, current gain, power gain, input and output impedances– simple problems - frequency response – bandwidth. **Emitter follower** –circuit diagram - features – applications. **Multistage amplifier** - need – overall gain – gain in dB – simple problems - methods of inter-stage coupling - RC coupled, transformer coupled and direct coupled multistage amplifiers - working principle - frequency response - applications – comparison			
CO2	**Develop basic tuned amplifiers and power amplifiers.**		
M2.01	Develop single tuned amplifier.	3	Applying

M2.02	Illustrate the frequency response and bandwidth of single and double tuned amplifiers.	3	Understanding
M2.03	Develop single and double ended power amplifiers.	4	Applying
M2.04	Summarize the classification of power amplifiers	2	Understanding
M2.05	List the advantages, disadvantages and applications of single and double ended power amplifiers.	3	Remembering
	Series Test I	1	

Contents:

Tuned Amplifier – need – types - Series and parallel resonant circuits – behavior – expression for resonant frequency, impedance - response curves – quality factor - relation between resonant frequency, "Q" and bandwidth - simple problems.

Single tuned amplifier - operation - frequency response - applications – limitations - Double tuned amplifier - frequency response for different degree of coupling – advantages.

Power Amplifier – comparison of voltage and power amplifier- impedance matching in power amplifier - classification of power amplifiers - class A, class B, class AB, and class C - nature of output - efficiency - cross over distortion - single ended power amplifier, class B push pull power amplifier - operation – expression for output power and efficiency – simple problems - advantages and disadvantages – applications

CO3	**Develop feedback amplifiers and Sinusoidal Oscillators**		
M3.01	Explain concept of feedback in amplifiers	4	Understanding
M3.02	Summarize the advantages of negative feedback in amplifiers	1	Understanding
M3.03	Illustrate negative feedback in transistor amplifier	2	Understanding
M3.04	Develop sinusoidal oscillators.	6	Applying
M3.05	List the applications of sinusoidal oscillators	2	Remembering

Contents:

Feedback in Amplifiers -positive and negative feedback - block diagram of feedback amplifier - expression for gain – derivation - Types of negative feedback - voltage, current, series and shunt connection (block diagram)- effect in i/p and o/p impedance.

Effects of negative feedback -improvement in amplifier parameters.

Typical current series and voltage series feedback amplifier circuits.

Oscillators - principle of operation - Barkhausen criterion for oscillation –principle of RC

oscillator - RC phase shift oscillator, Wien bridge oscillator –working – frequency of oscillation - Principle of LC oscillator - Hartley oscillator, Colpitts Oscillator – working - frequency of oscillation - piezoelectric effect - Crystal oscillator - operation - advantages - applications of oscillators

Design various sinusoidal oscillators for a given frequency of oscillation(oscillator part only)

CO4	**Make use of transistors to realize various pulse and switching circuits.**		
M4.01	Explain the working of transistor as a switch	1	Understanding
M4.02	Develop an astable multivibrator circuit using BJT	4	Applying
M4.03	Explain monostable and bistable multivibrator circuits	5	Understanding
M4.04	Develop Schmitt trigger circuit	2	Applying
M4.05	Develop UJT relaxation oscillator circuit	2	Applying
	Series Test II	1	

Contents:

Working of transistor as a switch

Multivibrators - types – Astable multivibrator – operation- waveforms – duty cycle - frequency of oscillation - applications

Monostable multivibrator - operation- waveforms - applications - Bistable multivibrator - operation- waveforms - applications

Schmitt trigger - operation- waveforms - LTP and UTP – hysteresis voltage – applications.

UJT relaxation oscillator - operation - waveform - frequency of oscillation - applications.

Design astable multivibrator and relaxation oscillator for a given frequency of oscillation (oscillator part).

Design Schmitt trigger for various UTPs and LTPs.

Text /Reference:

T/R	**BookTitle/Author**
T1	R S Sedha - A Text Book of Applied Electronics - S Chand
R1	N N Bhargava, Kulshreshtha and S C Gupta - Basic Electronics and Linear Circuits- TMH

R2	Robert Boylestad - Electronic Devices and Circuits - PHI
R3	Anil K Maini and Varsha Agarwal - Electronic Devices and Circuits - Wiley India
R4	David A Bell - Electronic Devices and Circuits - PHI
R5	Allen Mottorshead- Electronic Devices and Circuits-An introduction - Prentice-Hall of India Pvt.Ltd

Online resources:

Sl. No	Website Link
1	https://www.electronics-tutorials.ws
2	https://www.elprocus.com
3	http://www.brainkart.com/menu/electronics-engineering/
4	https://www.electrical4u.com