Lok Jagruti Kendra University
University with a Difference

Diploma in Electronics & Communication Engineering

LJ Polytechnic

Course Code: 025030301

Analog Electronics

Programme / Branch Name	Diploma in Electronics and Communication					
Course Name	Analog Electronics				**Course Code**	025030301
Course Type	HSSC	BSC	ESC	PCC	OEC	PEC

Legends: HSSC: Humanities and Social Sciences Courses BSC: Basic Science Courses
ESC: Engineering Science Courses PCC: Program Core Courses
OEC: Open Elective Courses PEC: Program Elective Courses

1. Teaching and Evaluation Scheme

Teaching Hours / Week / Credits				Evaluation Scheme			
L	**T**	**P**	**Total Credit**	**CCE**	**SEE (Th)**	**SEE (Pr)**	**Total Marks**
3	0	4	5	50	50	50	50

Legends:
L: Lectures T: Tutorial P: Practical
CCE: Continuous & Comprehensive Evaluation
SEE (Th): Semester End Evaluation (Theory)
SEE (Pr): Semester End Evaluation (Practical)

2. Prerequisite

- ✓ Physics and Mathematics (Pre-university level)
- ✓ Measure basic electrical quantities/parameters
- ✓ Use major electrical/electronic machines//instrument/equipment

3. Rationale

This course is one of the basic core courses which is must for every electronic engineer. Analogue electronic components and circuits are building blocks for any electronic device used in industries or in daily life. It is therefore necessary for electronics engineers to understand clearly the principles and functioning of the basic analogue components and circuits. This course will enable the students to understand the basics of construction, working, and applications of various types of electronic components such as UJT, JFET, MOSFET and circuits such as feedback amplifier, oscillator and operational amplifiers.

4. Objectives

- ✓ Analyze analog circuits consisting of active electronic components.
- ✓ Analyze electronic networks in terms of voltage, current, power, attenuation and frequency response highlight the importance of transformers in the transmission and distribution of electric power.
- ✓ It will build mathematical and numerical background for the design of electronics circuit & component value.

5. Contents

Unit No.	Topics	Sub-Topics	Learning Outcome	% Weightage	Hours
1	**Introduction to Transistor**	1.1. NPN and PNP transistor 1.2.Comparison between three configurations 1.3.classification of amplifiers	• operation • Transistor as an amplifier • Comparison between three configurations in terms of Input impedance, Output impedance, Current gain, Voltage gain • Classification of amplifiers. • RC coupled amplifier • Emitter follower and its Applications.	15	8
2	**Feedback in Amplifier**	2.1 Concept of feedback: negative and positive 2.2 Negative feedback in amplifiers 2.3 Derivation of equation for overall gain of negative feedback amplifier 2.4 The overall gain of feedback amplifiers for maintenance point of view 2.5 series and shunt type of feedback in amplifier circuits.	• Describe different types of feedback. • List the merits and demerits of negative feedback. • Explain the concept of negative feedback related to amplifier. • Gain, input impedance, output impedance, stability, bandwidth, frequency response, sensitivity, distortion, and noise • Voltage series amplifier, voltage • Shunt amplifier, current series amplifier, current shunt amplifier.	25	8
3	**Field Effect Transistor**	3.1 Introduction to Field Effect Transistor 3.2 JFET 3.3 MOSFET	• Classification of FET • Construction and Characteristics of JFETs • Transfer Characteristics, Depletion type MOSFET	15	8

			• Enhancement type MOSFET.		
4	**Oscillators**	4.1 Positive feedback in oscillators 4.2 Barkhausen's criteria for oscillation 4.3 Overall gain of positive feedback amplifier. 4.4 Tank circuit 4.5 The working principle of different types of oscillators 4.6 List applications of various types of oscillators. 4.7 555 Timer IC	• Justify the use of positive feedback in oscillator. • Describe working of tank circuit with sketches • RC phase shift oscillator circuit • Hartley oscillator circuit • Colpitts oscillator circuit • Crystal oscillator • Pin diagram and block diagram of 555 timer IC • 555 Timer IC as a Multivibrator	25	10
5	**Operational Amplifier**	5.1 Pin Diagram 5.2 Parameters of Op-Amp 5.3 Feedback Configuration 5.4 Differential Amplifier 5.5 DC and AC Amplifier 5.6 Summing, Scaling and Averaging Amplifier 5.7 Integrator 5.8 Differentiator 5.9 Filters	• Different parameters and configuration of Op-Amp • Feedback system in circuit • Different types of amplifiers with special purpose circuits • Filters and its types	20	9
				Total Hours	**43**

6. List of Practicals / Exercises

The practical/exercises should be properly designed and implemented in an attempt to develop different types of skills that students can acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

Sr. No	Practical / Exercises	Key Competency	Hours
1	To study of NPN and PNP transistor.	Transistor and types	2
2	Series and Shunt feedback amplifiers	Amplifier and types	2
3	To Study the switching action of FET.	FET and switching	2
4	JFET Characteristics	JFET construction	2
5	UJT as relaxation oscillator	UJT Working	2
6	Design of transistor RC phase shift oscillator	Oscillator and types	2
7	Design of transistor LC- Hartley oscillator	Oscillator and types	2

8	Design of transistor Colpitt oscillator	Oscillator and types	2
9	Design of Monostable Multivibrator	Multivibrator and types	2
10	Design of Bistable Multivibrator	Multivibrator and types	2
11	Design and test types of filter circuit	Amplifier and types	2
		Total hours	22

7. Suggested Specification Table with Hours

Unit No.	Chapter Name	Teaching Hours	Distribution of Topics According to Bloom's Taxonomy					
			R %	U %	App %	C %	E %	An %
1	Introduction to Transistor	8	40	20	20	0	10	10
2	Feedback in Amplifier	8	20	20	15	20	20	5
3	Field Effect Transistor	8	20	20	20	15	10	15
4	Oscillators	10	20	20	15	20	10	15
5	Operational Amplifier	9	30	20	20	10	10	10

Legends: R-Remembering C- Creating
U- Understanding E- Evaluating
App- Applying An- Analyzing

8. Textbooks

1) Network-Analysis-and-Synthesis-by-M-E-Van-Valkenburg
2) Electronic Devices and Circuit Theory Boylestad Robert Pearson, 2007 or latest

9. Reference Books

1) Electronic Devices and Circuits by Bell David A, Oxford University Press, 2008 or latest

10. Open Sources (Website, Video, Movie)

1) https://www.analog.com/en/index.html
2) https://www.engineersgarage.com/an-introduction-to-analog-electronics/
3) https://www.youtube.com/watch?v=uDxpygwJK1I
4) https://onlinecourses.nptel.ac.in/noc20_ee45/preview
5) https://mrcet.com/downloads/digital_notes/EEE/AE%20DIGITAL%20NOTES.pdf