



Gyanmanjari
Innovative University

Course Syllabus
Gyanmanjari Diploma Engineering College
Semester-4 (Diploma)

Subject: Integrated Electronics-DETEC14204

Type of course: Professional Core

Prerequisite: Electrical circuits, Basic Mathematics, Basic Electronics

Rationale:

Analog communication forms the foundation of traditional transmission systems. This course introduces key concepts like modulation, noise, and receiver design, helping students understand how signals are processed. It builds a bridge to digital communication and equips learners with essential skills for careers in telecom, broadcasting, and electronics, preparing them for advanced communication engineering studies.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P	C	Theory Marks		Practical Marks		CA	
				ESE	MSE	V	P	ALA	
4	0	2	5	60	30	10	20	30	150

Legends: CI-Classroom Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Course Content:

Unit No.	Course content	Hrs	% Weight age
1	Field Effect Transistors (FET): Introduction, Types of FET, JFET: Basic Construction of JFET, Principle and Working, V-I Characteristics, Analysis, Parameters, Amplifier: Common Source Amplifier, Common Drain Amplifier, Drawback, Principle of Operation. MOSFET: Types, D-MOSFET: Construction, Working, Operation, E-MOSFET: Construction, Working, Operation, Differences between JFET and MOSFET	15	25%



2	Operational Amplifier: Introduction to OP-Amp, Block diagram of Operational Amplifier, Schematic symbol of OP-AMP, Characteristics of Operational Amplifiers Ideal OP-Amp, Practical OP-Amp, Differential Amplifier, OP-Amp as Inverting Amplifier, OP-Amp as Non-Inverting Amplifier, OP-Amp Applications: Voltage Follower, Summing Amplifier, Integrator, Differentiator, Comparator Numericals	20	30%
3	Waveshaping circuits & Filters: Need of Wave Shaping Circuits, Classification, Linear Wave Shaping Circuits: Differentiators, Integrators, Non-Linear Wave Shaping Circuits: Clipping Circuits. Clamping Circuits. Schmitt Trigger, Multivibrators, Passive filters: Low pass, High pass, Band Pass, Band stop (Notch), OP-AMP Multivibrator: Astable, Monostable & Bistable Multivibrator using OP-AMP. Schmitt trigger using OP-AMP	15	25%
4	Oscillators: Feedback in Amplifier, Positive Feedback, Negative Feedback, Barkhausen Criteria, Effect of Feedback on Bandwidth, Loop Gain and Phase, Sinusoidal Oscillators, RC phase shift Oscillator, Wein Bridge Oscillator, Colpitts Oscillator, Hartley Oscillator.	10	20%

Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	Circuit Diagnosis Provide students with malfunctioning circuits. Their task is to troubleshoot and diagnose the issue. After solving the problem, students will upload a report on GMIU Web Portal.	10
2	Simulation Students have to design a waveform-generating circuit using a 555 timer IC as specified by the faculty and upload the completed circuit on the GMIU Web Portal.	10
3	Micro project Students will make a project(prototype) using IC and upload video on GMIU Web Portal.	10
Total		30



Suggested Specification table with Marks (Theory):60

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	30%	30%	30%	10%	0	0

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

After learning the course the students should be able to:	
CO1	Understand the basics of Field Effect Transistors (FETs), including their characteristics and operating principles
CO2	Familiarize with the working principles and internal structure of Operational Amplifiers.
CO3	Explain and apply the principles of wave-shaping circuits for generating various signal waveforms. Focus on the principles and applications of circuits used to shape waveforms.
CO4	Analyze and design various sinusoidal oscillators using the concept of feedback, apply Barkhausen criteria, and evaluate the effect of feedback on amplifier performance and bandwidth.

List of Practical:

Sr. No	Descriptions	Unit No	Hrs
1.	Study V-I Characteristics of JFET	1	2
2.	Study JFET as Common Drain Amplifier	1	2
3.	Study JFET as Common Source Amplifier	1	2
4.	Configure op-amp as inverting Amplifier	2	2
5.	Configure op-amp as non-inverting Amplifier	2	2
6.	Op-Amp as Voltage Follower Amplifier	2	2
7.	Design op-amp-based integrator circuit.	2	2
8.	Design op-amp-based differentiator circuit.	2	2



9.	To design a RC Low-pass filter and High Pass filter.	3	2
10.	To Design Band pass filter	3	2
11.	To Create Band stop filter	3	2
12.	To study Diode Clipper Circuit and Clamper	3	2
13.	To study RC Phase Shift Oscillator	4	2
14.	To study Wein Bridge Oscillator	4	2
15..	To study Colpitts Oscillator and Hartley Oscillator	4	2
TOTAL			30

Instructional Method:

The course delivery method will depend upon the requirement of content and the needs of students. The teacher, in addition to conventional teaching methods by black board, may also use any tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in the laboratory.

Reference Books:

- [1] Ramakant A. Gayakwad, "Op-Amps and Linear Integrated Circuits", By Pearson Education
- [2] J. Millman, *Integrated Electronics*. New Delhi, India: McGraw Hill Education Pvt. Ltd.
- [3] V. K. Mehta and Rohit Mehta, "Principles of Electronics", S. Chand Publication
- [4] N. N. Bhargava, D. C. Kulshreshtha, S. C. Gupta, "Basic Electronics and Linear Circuits", McGraw Hill India

