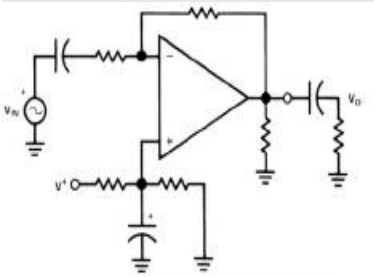

Source- https://www.electronicshub.org/analog-circuits-and-digital-circuits/

22EC201 ANALOG CIRCUITS

Hours Per Week :

L	T	P	C
3	0	2	4

PREREQUISITE KNOWLEDGE: Semiconductor Physics.

COURSE DESCRIPTION AND OBJECTIVES:

The goal of this syllabus, as its name implies, is to allow the reader to become proficient in the analysis and design of circuits utilizing modern linear ICs.

MODULE–1

UNIT-1 **12L+0T+8P=20 Hours**

BJT AMPLIFIERS:

Small signal amplifiers and Large signal amplifiers.

UNIT-2 **12L+0T+8P=20 Hours**

OPERATIONAL AMPLIFIER AND APPLICATIONS:

Differential Amplifier, current mirror biasing, IC 741 operational amplifier, Ideal and practical characteristics, Inverting and non-inverting configurations. Op-amp as Instrumentation amplifier, Summing amplifier, Integrator, Differentiator, Active filters, Schmitt triggers.

PRACTICES:

Design and Implementation of

- Design a CE amplifier for a particular gain and plot its frequency response.
- Verify the effect of cascading on gain and bandwidth of a multistage amplifier.
- Verify the conduction angle of all power amplifiers.
- Determine the conversion efficiency of a class B complementary symmetry power amplifier.
- Determine the conversion efficiency of a class AB complementary symmetry power amplifier
- Design an integrator and a differentiator using 741 Op-Amp IC.
- Design an inverting summing amplifier for a given equation.
- Design an instrumentation amplifier using 741 Op-Amp IC.
- Design a low pass filter and a high pass filter with certain cutoff frequency using 741 Op-Amp IC.
- Verify the working of Schmitt trigger using 741 IC.

MODULE-2

UNIT-1 **12L+0T+8P=20 Hours**

OP-AMP BASED OSCILLATORS & PLL:

Barkhausen's criterion for oscillations, Oscillators (RC and LC), PLL and its applications

UNIT-2 **12L+0T+8P=20 Hours**

TIMERS & DATA CONVERTERS:

IC555 timer and applications as astable and monostable multivibrator, Op-amp based DACs and ADCs - Characteristics of A/D and D/A converters, weighted resistor DAC, R-2R ladder DAC, flash ADC, successive approximation ADC and dual slope ADC.

PRACTICES:

- Design a RC phase shift oscillator using 741 IC for audio frequency range.
- Verify the functionality of PLL using IC 565.
- Design an astable multivibrator using 555 timer to generate a clock pulse with 60% duty cycle.
- Verify the functionality of an R-2R ladder DAC circuit.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Analyse and design of single stage, multistage and Power Amplifiers	Analyse	1	1, 2, 3,4, 5, 9, 10, 12
2	Design and elucidate linear and non-linear applications of op-amp and other ICs.	Apply	1, 2	1, 2, 3,4, 5, 9, 10, 12
3	Apply the concepts of op-amps to design oscillators and timers.	Apply	2	1, 2, 3,4, 5, 9, 10, 12
4	Analyse ADC's and DAC's.	Analyse	2	1, 2, 3,4, 5, 9, 10, 12

TEXT BOOKS:

1. J. Millman, C. Halkias and C. D Parikh "Integrated Electronics", 2nd edition, Tata McGraw-Hill, 2018.
2. D. Roy Choudhury and Shail B Jain, "Linear Integrated Circuits", 5th edition, New Age International (p) Ltd, 2018.

REFERENCE BOOKS:

1. Adel S. Sedra. Kenneth C. Smith and Arun N. Chandorkar, "Micro Electronic Circuits: Theory and Applications", 7th edition, Oxford University Press, 2017.
2. J M Fiore, Operational Amplifiers & Linear Integrated Circuits: Theory and Application Theory and Applications, Cambridge U Press, 2003.
3. M.H. Rashid, "Micro Electronic Circuits: Analysis and Design", 1st edition, Thomson PWS Publications, 1999.
4. Sergio Franco, "Design with Operational Amplifiers & Analog Integrated Circuits", 4th edition, McGraw Hill,1988.

SKILLS:

- ✓ *Design simple analog circuits to verify their behavior.*
- ✓ *Explain the operation of circuits using transistors in switching mode to achieve a variable DC output.*
- ✓ *Apply practical skills in the simulation, construction and testing of complex electrical and electronic circuits.*