

B.E. Semester: 4
Electronics & Communication Engineering
Subject Name: Advance Electronics
Subject code: EC-403

A. Course Objective :

The educational objectives of this course are

- To understand the Power supply (AC/DC).
- To study the basics of amplifiers and Oscillators circuits
- To understand the basics of operational amplifiers

B. Teaching / Examination Scheme :

Subject		Teaching Scheme				Total Credit	Examination Scheme					Total Marks
		L	T	P	Total		THEORY		IE	CIA	PR. / VIVO	
Code	Name	Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
EC-403	Advance Electronics	4	0	2	6	5	3	70	30	20	30	150

C. Detailed Syllabus :

1. Power Amplifier & power supply:

Class A, Second Harmonics Distortion, Higher Order Harmonics Generation Transformer-Coupled Audio Power Amplifiers, Efficiency, Push-Pull Amplifier, Class B, Class AB. Regulated Power Supply – Series Voltage Regulator Design, Short Circuit and Overload Protections, DC Coupled Power amplifiers, Voltage Regulator Ics.SMPS.

2. Negative Resistance Devices:

Tunnel diode, UJT, Negative resistance characteristic, basic circuit principles, monostable, bistable and astable operations, Voltage controlled switching circuits, Tunnel-diode monostable circuit and astable circuit, Tunnel-diodcomparator,Tunnel-diode monostable circuit. Tunnel diode transistor hybrid circuit, applications of UJT

3. Feedback Amplifiers :

Feedback Concept, Transfer Gain With Feedback, General Characteristics of Negative-Feedback Amplifiers, Input Resistance, Output Resistances, Method of Analysis of A Feedback Amplifier. Current-Shunt Feedback, Voltage-Shunt Feedback, Current-Series Feedback, Voltage-Series Feedback

4. Oscillators:

Sinusoidal Oscillator, Phase Shift Oscillators, Resonant-Circuit, Hartley Oscillators, Colpitts Oscillators, Wien Bridge Oscillators, Crystals Oscillator.

5. **Transistor at High Frequencies:**

Hybrid π -CE Transistor Model, Hybrid π -Conductance, Hybrid π -Capacitances, Validity of Hybrid π -Model, Variation of Hybrid π -Parameters, CE Short-Circuit Current Gain, Current Gain with Resistive Load, Single-Stage CE Transistor Amplifier Response, Gain-Bandwidth Product, Emitter Follower at High Frequencies

6. **Operational Amplifiers:**

Differential amplifier, DC and AC analysis of bipolar differential Amplifier, The ideal operational amplifier, Inverting and Non-inverting Amplifiers, Op-Amp Parameters, Measurement of Op-Amp Parameters, General description of various stages of Op-Amp, Open-loop and Closed-loop Frequency response, Op-Amp Stability, Frequency Compensation.

7. **Analog To Digital And Digital To Analog Converters:**

Digital To Analog Conversion, R-2R Ladder Type Dac, Weighted Resistor Type Dac, Analog To Digital Conversion, Counter Type A/D Converter, Tracking Type A/D Converter, Flash-Type A/D Converter, Dual Slope Type A/D Converter, Successive Approximation Type Adc.

D. Lesson Planning :

Sr. No	Lectures (Hours)	Weight age (%)	Topics
1	8	13	Power Amplifier & power supply: Class A, Second Harmonics Distortion, Higher Order Harmonics Generation Transformer-Coupled Audio Power Amplifiers, Efficiency, Push-Pull Amplifier, Class B, Class AB. Regulated Power Supply – Series Voltage Regulator Design, Short Circuit and Overload Protections, DC Coupled Power amplifiers, Voltage Regulator Ics.SMPS.
2	9	15	Negative Resistance Devices: Tunnel diode, UJT, Negative resistance characteristic, basic circuit principles, monostable, bistable and astable operations, Voltage controlled switching circuits, Tunnel-diode monostable circuit and astable circuit, Tunnel-diodcomparator,Tunnel-diode monostable circuit. Tunnel diode transistor hybrid circuit, applications of UJT
3	9	15	Feedback Amplifiers : Feedback Concept, Transfer Gain With Feedback, General Characteristics of Negative-Feedback Amplifiers, Input Resistance, Output Resistances, Method of Analysis of A Feedback Amplifier. Current-Shunt Feedback, Voltage-Shunt Feedback, Current-Series Feedback, Voltage-Series Feedback
4	7	12	Oscillators: Sinusoidal Oscillator, Phase Shift Oscillators, Resonant-Circuit, Hartley Oscillators, Colpitts Oscillators, Wien Bridge Oscillators, Crystals Oscillator.
5	9	15	Transistor at High Frequencies: Hybrid π -CE Transistor Model, Hybrid π -Conductance, Hybrid π -Capacitances, Validity of Hybrid π -Model, Variation of Hybrid π -Parameters, CE Short-Circuit Current Gain, Current Gain with Resistive Load, Single-Stage CE Transistor Amplifier Response, Gain-Bandwidth Product, Emitter Follower at High Frequencies

6	9	15	Operational Amplifiers: Differential amplifier, DC and AC analysis of bipolar differential Amplifier, The ideal operational amplifier, Inverting and Non-inverting Amplifiers, Op-Amp Parameters, Measurement of Op-Amp Parameters, General description of various stages of Op-Amp, Open-loop and Closed-loop Frequency response, Op-Amp Stability, Frequency Compensation.
7	9	15	Analog To Digital And Digital To Analog Converters: Digital To Analog Conversion, R-2r Ladder Type Dac, Weighted Resistor Type Dac, Analog To Digital Conversion, Counter Type A/D Converter, Tracking Type A/D Converter, Flash-Type A/D Converter, Dual Slope Type A/D Converter, Successive Approximation Type Adc.
Total	60	100	

E. Instructional Method And Pedagogy (Continuous Internal Assessment (CIA) Scheme) :

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures, practicals and Tutorial which carries 05 Marks.
- At regular intervals assignments is given. In all, a student should submit all assignments of 05 marks each.
- Classroom participation and involvement in solving the problems in Tutorial rooms carries 05 Marks.
- Viva Voce will be conducted at the end of the semester of 05 Marks.
- One internal exam of 30 marks is conducted as a part of mid semester evaluation.
- Experiments shall be performed in the laboratory related to course contents.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.

F. Suggested list of Experiments :

Sr. No. Name of the Experiments

1. To Perform Operation Of Hartley Oscillator.
2. To Perform Operation Of Colpitts Oscillator.
3. To Perform Operation Of Wein Bridge Oscillator.
4. To Perform Operation Of Phase Shift Oscillator.
5. To Perform Operational Amplifier As An Inverting Amplifier.
6. To Perform Operational Amplifier As An Non Inverting Amplifier.
7. To Perform The Operation Of Class A Amplifier.
8. To Perform Operation Of Cascode Amplifier.
9. To Perform The Operation Of Analog To Digital Converter.
10. To Perform The Operation Of Digital To Analog Converter.
11. To Perform Op-Amp As A Differential Amplifier.
12. Mini Project.

G. Students Learning Outcome :

On successful completion of the course

1. The student can learn about detailed aspects of Advance Electronics of all the areas in day to day life. Can also learn about power supply , Oscillators & A to D converter

H. Recommended Study Materials :

TEXT BOOK:

1. Millman & Halkias -Integrated Electronics, McGraw Hill.

REFERENCE BOOKS:

1. Electronics devices and circuits by Boylsted.
2. Electronics Device & circuits by sanjeev gupta by dhanpat rai publishing.
3. Electronics Devices and circuits by David A.Ball by Oxford publishing.

