Ramgarhia Polytechnic College, Phagwara

Electronics and Communication Engineering Department

Head of Department: Er. Simranjit Singh

Name of the Faculty: Er. Inderjeet kaur

Discipline: ECE

Semester: 3rd

Subject: Electronic Device & circuits

Lesson Plan Duration: 16 Weeks

RATIONALE

Having attained basic knowledge of electronic devices like diodes, transistors, and elementary circuits, in second semester, this course will enable the students to learn about the use of transistors in analog circuits like power amplifier, multistage amplifier, oscillators, wave shaping circuits and in multivibrators etc. It also gives information about timer, operational amplifier, voltage regulator, ICs and their applications for effective functioning in the field of electronic service industry

LEARNIG OUTCOMES

After undergoing the subject, student will be able to:

CO1. Demonstrate the concept of multistage amplifiers and plot the frequency response of the same

CO2. Measure the bandwidth of multistage amplifier

CO3. Describe the operation of large signal amplifiers.
CO4. Demonstrate the concept of negative and positive feedback.
CO5. Measure the gain of emitter follower and push pull amplifiers
CO6. Plot the frequency response of oscillators(Hartley, Colpitt, Wein Bridge)
CO7. Explain the concept of feedback amplifiers
CO8. Plot the frequency response of tuned voltage amplifiers
CO9. Design various wave-shaping circuits(concepts of clipping and clamping)
CO10. Describe the concept of multi-vibrators and operational amplifiers
CO11. Demonstrate the working of operational amplifier as inverter, integrator, differentiator, adder and subtractor.
CO12. Describe the concept of regulated DC supplies and opto-electric devices, VCO and PLL

PO ⇨ / CO ⇩	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	●		●				
CO2				●			●
CO3	●						●
CO4	●						
CO5		●		●			
CO6			●				
CO7	●						
CO8			●				
CO9			●				
CO10	●						
CO11				●		●	
CO12					●		

Syllabus

Units	Details	Hours
1.	Multistage Amplifiers - Need for multistage amplifier - Gain of multistage amplifier - Different types of multistage amplifier like RC coupled, transformer coupled, direct coupled, and their frequency response and bandwidth	(08 hrs)
2.	Large Signal Amplifier Difference between voltage and power amplifiers - Importance of impedance matching in amplifiers - Class A, Class B, Class AB, and Class C amplifiers, collector efficiency and Distortion in class A,B,C - Single ended power amplifiers, Graphical method of calculation (without derivation) of out put power; heat dissipation curve and importance of heat sinks. Push-pull amplifier, and complementary symmetry push-pull amplifier	(08 hrs)
3.	Feedback in Amplifiers - Basic principles and types of feedback - Derivation of expression for gain of an amplifier employing feedback - Effect of feedback (negative) on gain, stability, distortion and bandwidth of an amplifier - RC coupled amplifier with emitter bypass capacitor - Emitter follower amplifier and its application.	(08hrs)
4.	Sinusoidal Oscillators - Use of positive feedback - Barkhausen criterion for oscillations - Different oscillator circuits-tuned collector, Hartley, Colpitts, phase shift, Wien's bridge, and crystal oscillator. Their working principles (no mathematical derivation but only simple numerical problems)	(08hrs)
5.	Tuned Voltage Amplifiers - Series and parallel resonant circuits and bandwidth of resonant circuits. - Single and double tuned voltage amplifiers and their frequency response characteristics	(04hrs)
6.	Wave Shaping Circuits - General idea about different wave shapers - RC and RL integrating and differentiating circuits with their applications - Diode clipping and clamping circuits .	(04 hrs)
7.	Multivibrator Circuits - Working principle of transistor as switch - Concept of multi-vibrator: astable, monostable, and bistable and their applications - Block diagram of IC555 and its working and applications - IC555 as monostable and astable multi-vibrator	(08hrs)
8.	Operational Amplifiers - Characteristics of an ideal operational amplifier and its block diagram 97 - Definition of differential voltage gain, CMRR, PSRR, slew rate and input offset current - Operational amplifier as an inverter, scale changer, adder, subtractor, differentiator, and integrator	(06 hrs)
9.	Regulated DC Power Supplies - Concept of DC power supply. Line and load regulation - Concept of fixed voltage, IC regulators (like 7805, 7905), and variable voltage regulator like (IC 723)	(08 hrs)
10.	VCO (IC 565) and PLL (IC 566) and their Applications	(02 hrs)

Reference Books:

(1) Basic Electronics and Linear Circuits by NN Bhargava, Tata McGraw Hills, New Delhi
(2) Electronic Principles by Sahdev, Dhanpat Rai and Sons, New Delhi.
(3) Electronics Principles by Malvino, Tata McGraw Hills, New Delhi
(4) Electronic Devices and Circuits by Millman and Halkias, McGraw Hills, New Delhi
(5) Electronics Devices and Circuits by Bhupinderjit Kaur,modern Publishers, Jalandhar
(6) Basic Electronics by Grob, Tata McGraw Hills, New Delhi

Delivery/Instructional Methodologies

Sr.No.	Description
1.	Chalk and Talk
2.	PowerPoint Presentation

Assessment Methodologies

Sr. No.	Description	Type
1.	Student Assignment	Direct
2.	Test	Direct
3.	Board Examination	Direct
4.	Student Feedback	Direct

Gaps in the syllabus - to meet industry/profession requirements

S.NO.	DESCRIPTION	PROPOSED ACTIONS	PO MAPPING
	N/A	N/A	N/A

Topics beyond syllabus/advanced topics

Units	Details	Hours
N/A	N/A	N/A

Web Source References

Sr. No.	URL
1.	https://nptel.ac.in/

Lesson Plan

Week	Theory		Practical	
	Lecture Day		Practical Day	
1st	1st	Need ofmultistage amplifier.	1.	Plot the frequency response of two stage RC coupled amplifier and calculate the bandwidth and compare it with single stage amplifier
	2nd	Gain of multistage amplifie.r		
	3rd	Different types of multistage amplifier like RC coupled		
	4th	Transformer coupled		
2nd	5th	Direct coupled	2.	To measure the gain of push-pull amplifier at 1KHz
	6th			
	7th	Frequency response and		

	8th	bandwidth		
3rd	9th	Difference between voltage and power amplifiers	3.	To measure the voltage gain of emitter follower circuit and plot its frequency response
	10th	Importance of impedance matching in amplifiers		
	11th	Class A, Class B, Class AB, and Class C amplifiers		
	12th	Collector efficiency and		
4th	13th	Distortion in class A,B,C	4.	Plot the frequency response curve of Hartley and Colpitt's Oscillator
	14th	Single ended power amplifiers, Graphical method of calculation (without derivation) of out put power		
	15th	Heat dissipation curve and importance of heat sinks		
	16th	Push-pull amplifier, and complementary symmetry push-pull amplifier		
5th	17th	Basic principles and types of feedback	5.	Plot the frequency response curve of phase shift and Wein bridge Oscillator
	18th	Derivation of expression for gain of an amplifier employing feedback		
	19th	Effect of feedback (negative) on gain,		

	20th	stability, distortion and bandwidth of an amplifier		
6th	21st	RC coupled amplifier with emitter bypass capacitor	6.	REVISION/VIVA VOICE
	22nd			
	23rd	Emitter follower amplifier and its application		
	24th	**1st Sessional Test (Tentative)**		
7th	25th	Use of positive feedback	7.	To observe the output waveforms of series and shunt clipping circuits
	26th	Barkhausen criterion for oscillations		
	27th	Different oscillator circuits-tuned collector		
	28th	Hartley, Colpitts, phase shift,		
8th	29th	Wien's bridge	8.	To observe the output for clamping circuits
	30th	Crystal oscillator		
	31st	Their working principles (no mathematical derivation but only simple numerical problems)		
	32nd			
9th	33rd	Series and parallel resonant circuits and bandwidth of resonant circuits.	9.	Use of IC 555 as monostable multivibrator and observe the output for different values of RC
	34th			
	35th	Single and double tuned voltage amplifiers and their frequency response characteristics		
	36th			

10th	37th	General idea about different wave shapers	10.	Use of IC 555 as astable multivibrator and observe the output at different duty cycles
	38th	RC and RL integrating and differentiating circuits with their applications		
	39th	Diode clipping and clamping circuits .		
	40th	Working principle of transistor as switch		
11th	41st	Concept of multi-vibrator: astable, monostable, and bistable and their applications	11.	To use IC 741 (op-amplifier) as i) Inverter, ii) Adder, iii) Subtractor iv) Integrator
	42nd			
	43rd			
	44th	Block diagram of IC555 and its working and applications		
12th	45th	**2nd Sessional Test (Tentative)**	12.	To use IC 741 (op-amplifier) as i) Inverter, ii) Adder, iii) Subtractor iv) Integrator
	46th	IC555 as monostable multi-vibrator		
	47th	IC555 as astable multi-vibrator		
	48th	Characteristics of an ideal operational amplifier and its block diagram		

13th	49th	Definition of differential voltage gain, CMRR	13.	REVISION/ VIVA VOICE
	50th	PSRR, slew rate and input offset current		
	51st	Operational amplifier as an inverter, scale changer		
	52nd	Operational amplifier as an adder, subtractor		
14th	53rd	Operational amplifier as an differentiator, and integrator	14	To realize positive and negative fixed voltage AC power supply using three terminal voltage regulator IC (7805, 7812, 7905)
	54th	Concept of DC power supply. Line and load regulation		
	55th			
	56th	Concept of fixed voltage		
15th	57th	IC regulators (like 7805, 7905)	15.	**Class Project:** Fabricate any simple operational amplifier circuit (Inverter, Adder, Subtractor etc.) and test it.
	58th	Variable voltage regulator like (IC 723)		
	59th	Class Test		
	60th	VCO (IC 565) and PLL (IC 566) and their Applications		
16th	61st		16.	Practical Performance Test
	62nd	**PTM**		
	63rd	**REVISION**		
	64th	**3rd Sessional Test (Tentative)**		

NBA has defined the following seven POs for an Engineering diploma graduate:

i) **Basic and Discipline specific knowledge**: Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the engineering problems.

ii) **Problem analysis:** Identify and analyze well-defined engineering problems using codified standard methods.

iii**)** **Design/ development of solutions**: Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs.

iv) **Engineering Tools, Experimentation and Testing**: Apply modern engineering tools and appropriate technique to conduct standard tests and measurements.

v) **Engineering practices for society, sustainability and environment**: Apply appropriate technology in context of society, sustainability, environment and ethical practices.

vi) **Project Management**: Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities.

vii) **Life-long learning**: Ability to analyze individual needs and engage in updating in the context of technological changes.

Program Specific Outcomes (PSOs)

PSOs are a statement that describes what students are expected to know and be able to do in a specialized area of discipline upon graduation from a program. Program may specify 2-4 program specific outcomes, if required.

These are the statements, which are specific to the particular 11 program. They are beyond POs. Program Curriculum and other activities during the program must help in the achievement of PSOs along with POs.