



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
EL41	Analog Electronics-II	03	01	--	03	01	--	04
		Examination Scheme						
		ISE		MSE	ESE			
		10		30	100 (60% weightage)			

Pre-requisite Course Codes		EL31 (Analog Electronics - I)
After successful completion of the course, student will be able to		
Course Outcomes	CO1	Illustrate DC and AC analysis of single stage FET and MOSFET amplifier circuits
	CO2	Analyze multistage amplifier circuits
	CO3	Describe effect of negative feedback on amplifier parameters for different negative feedback topologies
	CO4	Discuss the working of different oscillator circuits.
	CO5	Calculate parameters for MOSFET based differential amplifier.
	CO6	Describe the working and calculate parameters for different power amplifier circuits.

Module No.	Unit No.	Topics	Ref.	Hrs.
1	1.1	DC Circuit Analysis: Junction Field Effect Transistor (JFET): Self bias, Voltage divider bias, Design and Analysis of Biasing Circuits Metal-Oxide Field Effect Transistor (MOSFET): Common-Source circuits, DC load line and region of operation, Common-MOSFETs configurations, Analysis and Design of Biasing Circuits	1,2	06
	1.2	AC Analysis: JFET Amplifiers: Small-Signal Equivalent Circuit, Small-Signal Analysis MOSFET Amplifiers: Graphical Analysis, load line and Small-Signal parameters, AC Equivalent Circuit, Small-Signal Model. Common-Source, Source Follower, Common-Gate	1,2	04
2	2.1	Multistage Amplifiers: Multistage (CS-CS), (CS-CE) cascode (CS-CG) Amplifiers & Darlington pair.	3,5	04
	2.2	Frequency analysis of amplifiers: Effect of capacitors (coupling, bypass, load) on frequency response of JFET and MOSFET Amplifiers, High frequency hybrid-pi equivalent circuits of MOSFET, Miller Effect and Miller capacitance, unity gain	1,3	06



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

		bandwidth, Low and high frequency response of single stage (CS,CG, CD) and multistage (CS-CS).		
3	3.1	Feedback amplifiers: Types of Negative Feedback, block diagram representation, Effect of negative feedback on Input impedance, Output impedance, Gain and Bandwidth with derivation, feedback topologies (analysis of different feedback circuits is not expected).	4,5	04
	3.2	Oscillators: Positive feedback and principle of oscillations, RC oscillators: Phase shift, Wien bridge, LC Oscillators: Hartley, Colpitts and clapp, Tuned Oscillator (no derivations), Twin T Oscillator (no derivations), Crystal Oscillator (BJT circuits analysis).	1,4,5	06
4	4.1	MOSFET Differential Amplifiers: DC Transfer characteristics, Small signal Analysis, differential and common mode gain, CMRR, differential and common mode input impedance.	1	04
	4.2	MOSFET Constant Current Sources: Two transistor current source, current relationship, output resistance. Improved three transistor current source, Cascode current source, Wilson and Widlar current source	1	04
5	5.1	Power amplifiers: Power BJTs, Power MOSFETs, Heat Sinks, Class A, Class B, Class C and Class AB operation, Power efficiency, Class AB output stage with diode biasing, VBE multiplier biasing, input buffer transistors, Darlington configuration.	1,2	06
			Total	42

References:

- [1] Donald A. Neamen, "Electronic Circuit Analysis and Design", TATA McGraw Hill, Second Edition.
- [2] Adel S. Sedra, Kenneth C. Smith and Arun N Chandorkar," Microelectronic Circuits Theory and Applications", International Version, OXFORD International Students Edition, Fifth Edition.
- [3] David A. Bell, "Electronic Devices and Circuits", Oxford, Fifth Edition.
- [4] S. Salivahanan, N. Suresh Kumar,"Electronic Devices and Circuits",Tata McGraw Hill, Third Edition
- [5] Jacob Millman,Christos C Halkias, and Satyabrata TIT,"Millman's Electronic Devices and Circuits",McGrawHill, Third Edition
- [6] Muhammad H. Rashid, "Microelectronics Circuits Analysis and Design", Cengage Learning, Second Edition