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
ET44	Integrated Circuit	3	1	--	3	1	--	4
		Examination Scheme						
		ISE		MSE		ESE		
		10		30		100 (60% Weightage)		

Pre-requisite Course Codes	ET31(Electronics Devices and Circuits) ET33 (Digital Circuits)	
After successful completion of the course, student will be able to		
Course Outcomes	CO1	Describe the fundamentals of Op-Amp.
	CO2	Analyse and design applications of Op-Amp.
	CO3	Design different applications using IC 555.
	CO4	Illustrate the function of Special Purpose ICs such as VCO, PLL, Power amplifier and DAC/ADC conversion technique.
	CO5	Design DC power supply like LVLC, LVHC, HVLC and HVHC using Regulator ICs.

Module No.	Unit No.	Topics	Ref.	Hrs.
Module 1		**Operational Amplifier Overview**	1,2,3, 4	04
	1.1	Op-Amp symbol and Terminals, Ideal Op-Amp and Practical Op-Amp characteristics, Op-Amp Parameters, open loop and closed loop configurations, Virtual ground concept.		
	1.2	Inverting and Non-inverting modes, Feedback in Op-Amp Circuits (Positive and Negative).		
Module 2		**Applications of Operational Amplifier**	1,2,3, 4	10
	2.1	**Amplifiers:** Current amplifier, difference amplifier, instrumentation amplifier and programmable gain amplifier.		
	2.2	**Converters:** Current to voltage converters, voltage to current converters, voltage to frequency converter, frequency to voltage converter, logarithmic converters and antilog converters.		
	2.3	**Active Filters:** Low pass, high pass, band pass and band reject filters.		
	2.4	**Sine Wave Oscillators:** RC phase shift oscillator, Wien bridge oscillator, Quadrature oscillator.		

Module 3		**Non-Linear Applications of Operational Amplifier**	1,2,3, 4	10
	3.1	**Comparators:** Inverting comparator, non-inverting comparator, zero crossing detector, window detector and level detector.		
	3.2	**Schmitt Triggers:** Inverting Schmitt trigger, non-inverting Schmitt trigger, and adjustable threshold levels.		
	3.3	**Waveform Generators:** Square wave generator, triangular wave generator, and duty cycle modulation.		
	3.4	**Precision Rectifiers:** Half wave, full wave and applications.		
	3.5	Peak detectors, sample and hold circuits.		
		Special Purpose Integrated Circuits		
Module 4	**4.1**	**Functional block diagram, working, design and applications:** Timer 555.	1,4	08
	4.2	**Functional block diagram, working and applications:** VCO 566, PLL 565, multiplier 534, waveform generator XR 2206, Power amplifier LM380.		
Module 5		**Voltage Regulators**	1,4	06
	5.1	**Functional block diagram, working and design** of three terminal fixed (78XX, 79XX series) and three terminal adjustable (LM 317, LM 337) voltage regulators.		
	5.2	**Functional block diagram, working and design** of general purpose 723 (LVLC, LVHC, HVLC and HVHC) with current limit and current fold-back protection.		
Module 6		**ADC and DAC Conversion**		
	6.1	D to A Conversion Techniques, R - 2R ladder, Multiplying DAC with Applications, A to D Conversion Techniques, Dual slope ADC, Ramp ADC, Successive approximation ADC.	1,4	04
Total				**42**

References:

1. Sergio Franco, Design with Operational Amplifiers and analog integrated circuits, Third edition, McGraw Hill International edition, 2002.
2. D. Roy Choudhury and S. B. Jain, "*Linear Integrated Circuits*", New Age International Publishers, 4th Edition
3. Ramakant A. Gayakwad, "*Op-Amps and Linear Integrated Circuits*", Pearson Prentice Hall, 4th Edition
4. Robert Coughlin, Frederick F. Driscoll, Operational Amplifiers and Linear Integrated circuits, PHI Learning, sixth edition.