

**EC 603 EC : Analog Integrated Circuit  
B. E. III ( ECC) 6<sup>th</sup> Sem. (2009)**

	Lecture	Tutorial	Practical
Teaching Hours	3	1	2
Examination Scheme Marks	100	25	Cont. Evaluation : 20 Examination : 30

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Lec no	Topic	Book	Ref.
1.	<b>Introduction and Scope of the Subject.</b> Comparison between analog and Digital electronics. Importance and Applications of Analog Integrated Circuits. Introduction to operational amplifier Basic block diagram of internal circuitry for Op-amp, symbol.	[1] CH:1 1-3	[4]
2.	Op-amp as a comparator: Zero crossing Detector, Positive Level Detector, Negative Level Detector. Open loop configuration	[1] CH:8 44-46, 314-317	
3.	Analysis of op-amp equivalent circuit, Manufacturer Specifications for a typical IC 741-Operational amplifier, data sheets for the same.	[1] CH [2] 23-26	
4.	<b>Differential and Cascode Amplifiers:</b> Differential amplifier, different configuration of differential amplifier, (Dual i/p Balanced o/p, dual i/p unbalanced o/p, Single i/p balanced o/p, Single i/p unbalanced o/p)	[1] CH:1 2-7 (Third Edition)	
5.	DC analysis of different circuit configurations.	7-10 (Third Edition)	
6.	Differential amplifier with swamping resistor and numericals based on above configurations.	[1] CH:1 24-27 (Third Edition)	
7.	Constant current bias and current mirror circuit as the special case of Constant Current Bias, examples.	[1] CH:1 28-38 (Third Edition)	
8.	Cascaded differential amplifier stages and level translator Circuit, DC analysis of Cascade amplifier.	[1] CH:1 39-48 (Third Edition)	
9.	Characteristics of ideal Op-amp, Equivalent Circuit of op-amp,	[1]	

	Ideal Voltage transfer Curve.	42-44	
10.	Block diagram representation of Feedback amplifier. Derivation of gain with feedback in terms of Without feedback, i/p-o/p impedance for Voltage series negative feedback.	[2] CH4 119-127	
11.	<b>General Linear Applications:</b> Inverting and non-inverting configuration with feedback. Summing, Scaling and averaging amplifiers	[1] CH:6 200-207	[4]
12.	Concept of virtual ground, Op-amp as a buffer, differential amplifier using one and two op-amp. Instrumentation amplifier.	[1] CH:3, 6 96-101, 207-210	[4]
13.	Integrator Circuit with their frequency response and numericals.	[1] CH:6 229-232	[4]
14.	Differentiator Circuit with their frequency response and numericals.	[1] 232235	
15.	Voltage to current converter with floating and grounded load, Current to voltage converter	[1] CH:6 223-226	[4]
16.	Schmitt trigger circuit with its Hysteresis loop and upper and lower threshold voltages, Comparator circuits,	[1] CH:9 317-323	[4]
17.	Voltage limiters. window detector ckt using op-amp	[1] CH 8 323-330	
18.	Rectifiers: Half wave and Full wave rectifiers. Modified circuits for the same and numericals	[1] CH: 8 354-356	[4]
19.	Positive and Negative Clippers and clampers as an application of Op-amp.	[1] CH:8 351-353, 356-358	[4]
20.	Peak detector , Peaking amplifier, Sample and hold Circuit	[1] CH:9 361-363, 198-200	
21.	Test		
22.	<b>Parameters of the Op-Amp:</b> Input Offset voltage and current, CMRR, Slew rate, input bias current, diff. input resistance, offset voltage adjustment range, supply voltage rejection ratio etc.,	[1] CH:2 34-40	
23.	Test		
24.	<b>Filters: types of active filters:</b> Advantages and disadvantages of active filters, Classification of Filters. Order of Filters, applications of active filters,	[1] CH:7 250-253	
25.	First order and second order low pass Butterworth filter.	[1]	

		CH:7 253-260	
26.	First order and second order High pass Butterworth filter, Band Pass Filter and their Characteristics	[1] CH:7 261-265, 268-274	
27.	Band reject filters (Narrow band reject, wide band reject) and its applications and numericals.	[1] CH: 7 275-275	
28.	All pass filter and its application in providing desired phase shifts and examples,	[1] CH: 7 277-279	
29.	Notch filter, its derivation and examples	[1] CH: 7 276,	
30.	<b>Oscillators:</b> Frequency Stability concept for the oscillations to sustain. Classification of Oscillators, R-C Phase shift Oscillator.	[1] CH:7 279-283	
31.	Wien bridge oscillator with its derivation of frequency and application of the same	[1] CH:7 283-285	
32.	Square Wave, triangular Wave and saw tooth wave generators with their modified circuits.	[1] CH:7 287-294	
33.	<b>555 Timer IC:</b> Introduction, features, terminals, Time on delay application	[3] CH:13 362-370	[1]
34.	555 Timer as Astable Multivibrator, Design procedure, Application as a Square wave Oscillator and Free-running Ramp generator	[3] CH:13 371-378	[1]
35.	555 Timer as Monostable Multivibrator Design procedure, applications as Pulse Stretcher and frequency divider.	[3] CH:13 378-384	[1]
36.	A/D converters characteristics, different types, Successive approximation, Integrating ADC.	[1] CH:9 376-377	
37.	D/A converters with its characteristics	[3] CH:14 400-405	[2]
38.	D/A converter with Binary weighted resistors, R-2R ladder network.	[3] 406-408	[2]
39.	Monostable multivibrator circuit using Op-amp.	[3] CH:6 156-160	
40.	Related numericals.		
41.	Revision & query		
42.	Test		

**Reference Books:**

1. Ramakant Gayakwad: Op Amps and Linear Integrated Circuits, Pearson Education 4/e, seventh Indian reprint, 2004 + Certain topics from third Edition.
2. Franco: Design With Operational Amplifiers And Analog Integrated Circuits. McGraw Hill. 2/e, 2000.
3. Coughlin and Driscoll: Op Amps and Linear Integrated Circuits, 6<sup>th</sup> edition.
4. Botkar K. R. Integrated Ckts: Khanna publishers Delhi, 9th ed, 2002.