

Electronic Devices and Circuits				
CLASS S.E (INFORMATION TECHNOLOGY)				
SEMESTER III				
HOURS PER WEEK	LECTURES	:		04
	TUTORIALS	:		
	PRACTICALS	:		02
			HOURS	MARKS
EVALUATION SYSTEM:	THEORY		3	100
	PRACTICAL		--	--
	ORAL		--	25
	TERM WORK		--	25

Objective of the course: The course intends to provide an overview of the principles, operation and application of the analog building blocks for performing various functions. This first course relies on elementary treatment and qualitative analysis and makes use of simple models and equation to illustrate the concepts involved. Detailed knowledge of the device structure and imperfection are not to be considered.

1. Introduction to BJT amplifiers:

- Principle of operation of BJT, DC biasing, Fixed Bias , Collector to Base Bias, Voltage Divider Bias circuits
- Small signal operation and analysis of CE, CB, CC amplifier configuration,
- SPICE simulation example of amplifier

2. Differential Amplifiers:

- Types of differential amplifier, Differential amplifier with swamping resistors, DC analysis
- AC analysis, Differential gain, common mode gain, CMRR .
- Constant current bias, current mirror circuits.
- SPICE simulation example of differential amplifier.

3. Operational Amplifiers and its general linear applications:

- Block diagram representation, Ideal Op-amp, Equivalent circuit, Open-loop configuration, Transfer characteristics. Op-amp with negative feedback, Frequency response. Popular Op-amp IC 741 specifications and performance characteristics.
- Basic op-amp applications: Adder, Scalar, Subtractor, Difference amplifier, I-V converter, V-I converters, Integrator, Differentiator, Instrumentation amplifier using 2 and 3 op-amp stages.
- SPICE simulation of Op-amp.

4. Active Filters and Oscillators:

- First order low pass Butterworth filter, Second order low pass Butterworth filter, First order high pass Butterworth filter, Second order high pass Butterworth filter, Band pass filter, Band reject filter, All pass filter
- Oscillator: principle, Phase shift oscillator, Wien bridge oscillator, Quadrature oscillator, amplitude stabilization in oscillators.
- SPICE simulation of Filters and Oscillators.

5. Signal generators and wave shaping circuits:

- Op-amp used as basic comparator, Zero crossing detector, Schmitt trigger comparator and transfer characteristics.
- Precision rectifier circuits, Peak detector, clamping circuit.
- Square wave generators, Triangular wave generator, Saw tooth wave generators
- Astable multivibrator, Monostable multivibrator
- Data Converters: Analog to digital converter and Digital to analog converter principles, D-A converter with binary weighted resistors, D-A converter with R-2R Ladders. Successive approximation A-D converter
- SPICE simulation examples.

6. Specialized IC applications:

- Timer IC 555 and its use as monostable and astable multivibrator, Specifications and performance characteristics.
- Voltage regulator IC 723 and its use as variable voltage regulator, Specifications and performance characteristics.

- **Text Books:**

1. Ramakant A. Gayakwad, "OP-Amps and Linear Integrated Circuits", Pearson Education D.Roy Choudhary and Shail Jain, " Linear Integrated Circuits", New Age International Publishers.

2. Sundaram Natarajan, 'Microelectronics Analysis and Design' Tata McGraw-Hill Publishing Company Limited
3. Adel S. Sedra and Kenneth C. Smith, 'Microelectronic Circuits' Fifth Edition Oxford University Press

5. David Bell "Electronic Devices and Circuits", Oxford University Press

References:

1. Jacob Millman, Christos C Halkias, Satyabrata JIT, "Millman's Electronic Devices and Circuits", McGraw Hill International Edition.
2. S Salivahanan, N Suresh Kumar, A Vallavaraj, "Electronic devices and circuits", Tata McGraw-Hill

Term Work:

Term work shall consist of at least 10 experiments and one written test.

Distribution of marks for term work shall be as follows:

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| 1. Attendance (Theory and Practical) | 05 Marks |
| 2. Laboratory work (Experiments and Journal) | 10 Marks |
| 3. Test (at least one) | 10 Marks |

The final certification and acceptance of TW ensures the satisfactory

Performance of laboratory Work and Minimum Passing in the term work.