

## **ANALOG ELECTRONIC CIRCUITS**

**Code : EC 304**

Contacts : 3L +1T =4hrs

**Credits : 4**

**Module-1:** [10]

a) Filters and Regulators: Capacitor filter,  $\pi$ -section filter, ripple factor, series and shunt voltage regulator, percentage regulation, 78xx and 79xx series, concept of SMPS. [4]

b) Transistor Biasing and Stability: Q-point, Self Bias-CE, Compensation techniques, h-model of transistors. Expression for voltage gain, current gain, input and output impedance, trans-resistance & trans-conductance; Emitter follower circuits, High frequency model of transistors. [6]

**Module -2:** [10]

1. Transistor Amplifiers: RC coupled amplifier, functions of all components, equivalent circuit, derivation of voltage gain, current gain, input impedance and output impedance, frequency response characteristics, lower and upper half frequencies, bandwidth, and concept of wide band amplifier. [6]

2. Feedback Amplifiers & Oscillators: Feedback concept, negative & positive feedback, voltage/current, series/shunt feedback, Barkhausen criterion, Colpitts, Hartley's, Phase shift, Wein bridge and crystal oscillators. [4]

**Module -3:** [10]

1. Operational Amplifier: Ideal OPAMP, Differential Amplifier, Constant current source (current mirror etc.), level shifter, CMRR, Open & Closed loop circuits, importance of feedback loop (positive & negative), inverting & non-inverting amplifiers, voltage follower/buffer circuit. [6]

2. Applications of Operational Amplifiers: adder, integrator & differentiator, comparator, Schmitt Trigger. Instrumentation Amplifier, Log & Anti-log amplifiers, Trans-conductance multiplier, Precision Rectifier, voltage to current and current to voltage converter, free running oscillator. [6]

**Module -4:** [8]

1. Power amplifiers – Class A, B, AB, C, Conversion efficiency, Tuned amplifier [4]

2. Multivibrator – Monostable, Bistable, Astable multivibrators; Monostable and astable operation using 555 timer. [2]

3. Special Functional Circuits: VCO and PLL. [2]

### **Text Books:**

1. Sedra & Smith-Microelectronic Circuits- Oxford UP
2. Franco—Design with Operational Amplifiers & Analog Integrated Circuits , 3/e, McGraw Hill
3. Boylested & Nashelsky- Electronic Devices and Circuit Theory- Pearson/PHI

### **Reference Books:**

1. Millman & Halkias – Integrated Electronics, McGraw Hill.
2. Rashid-Microelectronic Circuits-Analysis and Design- Thomson (Cenage Learning)