

# UNDERGRADUATE PROGRAMME IN ELECTRONICS

## Semester-IV

**EL-8**

**Analog Electronics-II**

**Total Periods: 48**

Unit-1

(P-15)

Basic Operational Amplifier: Concept of differential amplifiers (Dual input balanced and unbalanced output), constant current bias, current mirror, cascaded differential amplifier stages with concept of level translator, block diagram of an operational amplifier (IC 741)

Op-Amp parameters: input offset voltage, input offset current, input bias current, differential input resistance, input capacitance, offset voltage adjustment range, input voltage range, common mode rejection ratio, slew rate, supply voltage rejection ratio.

Op-Amp in open and closed loop configuration: Frequency response of an op-amp in open loop and closed loop configurations, Inverting, Non-inverting, summing and difference amplifier, Integrator, Differentiator, voltage to current converter, current to voltage converter.

Unit-2

(P-11)

Comparators: Basic comparator, Level detector, Voltage limiters, Schmitt Trigger.

Signal generators: Phase shift oscillator, Wein bridge oscillator, Square wave generator, triangle wave generator, saw tooth wave generator, and Voltage controlled oscillator (IC 566).

Unit-3

(P-11)

Multivibrators (IC 555): Block diagram, Astable and monostable multivibrator circuit, Applications of Monostable and Astable multivibrators. Phase locked loops (PLL): Block diagram, phase detectors, IC565.

Unit- 4

(P-11)

Signal Conditioning circuits: Sample and hold systems, Active filters: First order low pass and high pass butterworth filter, Second order filters, Band pass filter, Band reject filter, All pass filter, Log and antilog amplifiers.

Essential Text:

Unit-1: Chapter- 1 to 7, R. A. Gayakwad, Operational-Amplifiers and Linear IC's, 2<sup>nd</sup> Edition, PHI(1997)

Unit-2: Chapter- 8&9 , R. A. Gayakwad, Operational-Amplifiers and Linear IC's, 2<sup>nd</sup> Edition, PHI (1997)

Unit-3: Chapter-10, R. A. Gayakwad, Operational-Amplifiers and Linear IC's, 2<sup>nd</sup> Edition, PHI (1997)

Unit-4: Chapter- 8&9, R. A. Gayakwad, Operational-Amplifiers and Linear IC's, 2<sup>nd</sup> Edition, PHI (1997); Chapter-4, Roy Choudhry and Shail Jain, Linear Integrated Circuits, New Age International Publishers Ltd (2001).

Suggested Books:

1. R. F. Coughlin and F. F. Driscoll, Operational amplifiers and Linear Integrated circuits, Pearson Education (2001)
2. J. Millman and C.C. Halkias, Integrated Electronics, Tata McGraw-Hill,(2001)
3. A.P.Malvino,Electronic Principals,6<sup>th</sup> Edition , Tata McGraw-Hill,(2003)
4. K.L.Kishore,OP-AMP and Linear ICs,Pearson(2011)

## UNDERGRADUATE PROGRAMME IN ELECTRONICS

### EL-7-Practical based on Analog Electronics-II

(At least five practical to be performed in hardware and software.)

1. To study op-amp characteristics: CMRR and Slew rate.
2. To design an amplifier of given gain for an inverting and non-inverting configuration using an op-amp.
3. To design an integrator using op-amp for a given specification and stud its frequency response.
4. To design a differentiator using op-amp for a given specification and stud its frequency response.
5. To design a First Order Low-pass filter using op-amp.
6. To design a First Order High-pass filter using op-amp.
7. To design a RC Phase Shift Oscillator using op-amp.
8. To study IC 555 as an astable multivibrator.