EC-303 **LINEAR IC'S AND ITS APPLICATIONS** **L T P C**
4 1 - 3

COURSE OBJECTIVES:

1. To know the idealized and practical equivalent circuits of op amp.
2. To know design of filters using op amps and static op amp limitations.
3. To know the dynamic op amp limitations and stability of op amp circuits.
4. To know the operation of nonlinear circuits and signal generators using op amps.
5. To know the A-D and D-A conversion techniques.

COURSE OUTCOMES:

After successful completion of the course, the students are able to

1. demonstrate knowledge in (i)V to I and I to V convertors, (ii)Active filters, (iii)Stability of Op amp, (iv)Comparators, (v)Signal generators, (vi)A-D and D-A conversion techniques.
2. elucidate and design the basic op-amp circuits such as linear and non-linear circuits, Active filters, signal generators, and data converters.
3. infer the DC and AC characteristics of operational amplifiers its effect on output, and their compensation techniques.
4. demonstrate the applications of linear and Nonlinear Amplifiers.
5. examine the working of D-A, A-D Converters, Schmitt trigger, precision rectifiers, peak detectors, and sample & hold circuit.

UNIT I **(13)**

Operational Amplifier Fundamentals: amplifier fundamentals, the operational amplifier, basic op amp configurations, ideal op amp circuit analysis, feedback in op amp circuits, op amp powering.

Circuits with Resistive Feedback: current to voltage converters, voltage to current converters, current amplifiers, difference amplifiers, instrumentation amplifiers.

UNIT II **(13)**

Active Filters: common frequency responses, the transfer function, first order active filters, standard second order responses, filter approximations cascade design direct design.

Static Op-Amp Limitations: simplified op amp circuit diagram, input bias and offset currents, input offset voltage, input offset error compensation, maximum ratings.

UNIT III **(13)**

Dynamic Op-Amp Limitations: open loop response, closed loop response, transient response, effect of finite gbp on integrator circuits, effect of finite gbp on filters.

Stability: the stability problem, stability in constant-gbp op amp circuits, internal frequency compensation, external frequency compensation.

UNIT IV **(13)**

Nonlinear Circuits: voltage comparators, comparator applications, schmitt trigger, precision rectifiers, peak detectors, sample and hold amplifiers

Signal Generators: sine wave generators, multivibrators, monolithic timers, triangular wave generators, saw tooth wave generators, monolithic waveform generators.

UNIT V **(13)**

D-A and A-D Converters: performance specifications, d-a conversion techniques, a-d conversion techniques.

Nonlinear Amplifiers and Phase Locked Loops: log / antilog amplifiers, analog multipliers, phase-locked loops

LEARNING RESOURCES:

TEXT BOOK(s):

Sergio Franco - Design with Operational Amplifiers and Analog Integrated Circuits, 3rd Edition, TMH, 2002

REFERENCE BOOK(s):

1. RamaKant A. Gayakwad - Op-Amps and Linear Integrated Circuits, 4th Edition, PHI, Pearson Education, 2003.
2. D.Roy and Choudhury - Shail B.Jain, Linear Integrated Circuits, 2nd Edition, New Age International, 2003.

WEB RESOURCES:

1. http://nptel.ac.in/courses/117108038/
2. http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-01sc-introduction-to-electrical-engineering-and-computer-science-i-spring-2011/unit-3-circuits/op-amps/