

**Maulana Abul Kalam Azad University of Technology, West Bengal**  
**Syllabus for B. Tech in Electronics & Communication Engineering**  
(Applicable from the academic session 2018-2019)

<b>EC402</b>	<b>Analog circuits</b>	<b>3L:0T:0P</b>	<b>3 credits</b>
--------------	------------------------	-----------------	------------------

**Module I**

**10L**

Diode Circuits: Rectifiers, Clipper, Clamper

Amplifier models: Voltage amplifier, current amplifier, trans-conductance amplifier and trans-resistance amplifier.

Biasing schemes for BJT and FET amplifiers, bias stability, various configurations (such as CE/CS, CB/CG, CC/CD) and their features, small signal analysis, low frequency transistor models, estimation of voltage gain, input resistance, output resistance etc., design procedure for particular specifications, low frequency analysis of multistage amplifiers.

**Module II**

**6L**

High frequency transistor models, frequency response of single stage and multistage amplifiers, cascode amplifier. Various classes of operation (Class A, B, AB, C etc.), Feedback topologies: Voltage series, current series, voltage shunt, current shunt, effect of feedback on gain, bandwidth etc.,

**Module III**

**6L**

Oscillators: Review of the basic concept, Barkhausen criterion, RC oscillators(phase shift, Wien bridge etc.), LC oscillators (Hartley, Colpitt, Clapp etc.), Multivibrators (Monostable, Astable and Bistable)

Current mirror: Basic topology and its variants, V-I characteristics, output resistance and minimum sustainable voltage (VON), maximum usable load.

**Module IV**

**10L**

Differential amplifier: Basic structure and principle of operation, calculation of differential gain, common mode gain, CMRR and ICMR.

OP-AMP: Basic structure and characteristics, inverting and non-inverting amplifiers

OP-AMP applications: Integrator and differentiator, summing amplifier, Log-Antilog amplifiers, , Schmitt trigger and its applications.

Active filters: Low pass, high pass, band pass and band stop, design guidelines.

**Text/Reference Books:**

1. J. Millman and A. Grabel, Microelectronics, 2nd edition, McGraw Hill, 1988.
2. J.V. Wait, L.P. Huelsman and GA Korn, Introduction to Operational Amplifier theory and applications, McGraw Hill, 1992.
3. P. Horowitz and W. Hill, The Art of Electronics, 2nd edition, Cambridge University Press, 1989.
4. A.S. Sedra and K.C. Smith, Microelectronic Circuits, Saunder's College11 Publishing, Edition IV
6. Paul R. Gray and Robert G.Meyer, Analysis and Design of Analog Integrated Circuits, John Wiley, 3<sup>rd</sup> Edition
7. A.K. Maini, Analog Electronics, Khanna Publishing House, New Delhi, AICTE Recommended-2018.

**Course Outcomes:**

At the end of this course students will demonstrate the ability to

1. Understand the characteristics of diodes and transistors
2. Design and analyze various rectifier and amplifier circuits
3. Design sinusoidal and non-sinusoidal oscillators
4. Understand the functioning of OP-AMP and design OP-AMP based circuits