

**Maulana Abul Kalam Azad University of Technology, West Bengal**  
(Formerly West Bengal University of Technology)

**Syllabus for B. Tech in Electrical Engineering**  
(Applicable from the academic session 2018-2019)

Special Remarks: The above-mentioned outcomes are not limited. Institute may redefine outcomes based their program educational objective.

Name of the course		ANALOG ELECTRONICS	
Course Code: PC-EE 302		Semester: 3 <sup>rd</sup>	
Duration: 6 months		Maximum Marks: 100	
Teaching Scheme		Examination Scheme	
Theory: 3 hrs/week		Mid Semester Exam: 15 Marks	
Tutorial: 0 hr/week		Assignment & Quiz: 10 Marks	
Practical: 2 hrs/week		Attendance: 05 Marks	
Credit Points: 3+1		End Semester Exam: 70 Marks	
Objective:			
1.	To understand the structure and properties of different components of analog electronics.		
2.	To explain principle of operation of analog electronics components and circuits.		
3.	To understand the application of operational amplifier		
4.	To solve problems of analog electronic components and circuits		
5.	To analyze amplifiers, oscillators and other analog electronic circuits.		
Pre-Requisite			
1.	Physics (10+2)		
Unit	Content	Hrs	Marks
1	<b>Filters &amp; Regulators:</b> Review of half wave and full wave rectifier, Capacitor filters, $\pi$ -section filter, ripple factor, series and shunt voltage regulator, percentage regulation.	4	
2	<b>BJT circuits:</b> Structure and I-V characteristics of a BJT; BJT as a switch. BJT as an amplifier: small-signal model, biasing circuits, current mirror; common-emitter, common-base and common-collector amplifiers; Small signal equivalent circuits, high-frequency equivalent circuits	8	
3	<b>MOSFET circuits:</b> MOSFET structure and I-V characteristics. MOSFET as a switch. MOSFET as an amplifier: small-signal model and biasing circuits, common-source, common-gate and common-drain amplifiers; small signal equivalent circuits - gain, input and output impedances, trans-conductance, high frequency equivalent circuit.	8	
4	<b>Feed back amplifier &amp; Oscillators:</b> Concept of Feed back, Negative & Positive feedback, Voltage/Current, Series/Shunt feedback, Berkhausen criterion, Colpit , Hartley's, Phase shift, Wien bridge, & Crystal oscillators.	5	
5	<b>Operational amplifier:</b> 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 circuits.	5	

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6	<b>Application of Operational amplifiers:</b> Adder, Integrator & Differentiator, Comparator, Schmitt Trigger, Instrumentation Amplifier, Log & Antilog amplifier, Trans-conductance multiplier, Precision rectifier, Voltage to current & Current to voltage converter.	5	
7	<b>Power amplifier:</b> Class A, B, AB, C, Conversion efficiency	2	
8	<b>Multivibrator:</b> Monostable, Bistable multivibrator, Monostable & Astable operation using 555 timer.	2	
9	<b>Special function circuits:</b> VCO & PLL	2	

Text books:

1. Malvino—Electronic Principles , 6/e ,TMH
2. Nagrath, Electronics: Analog and Digital, PHI, 2004
3. Mottershed, Electronics Devices & Circuits, Wiley Eastern
4. Millman & Halkias – Integrated Electronics, Tata McGraw Hill.
5. Gayakwad R.A -- OpAmps and Linear IC's, 4/e, Pearson-PHI
6. Franco—Design with Operational Amplifiers & Analog Integrated Circuits , 3/e,TMH
7. Coughlin and Drisscol – Operational Amplifier and Linear Integrated Circuits – Pearson Education Asia.
8. A.K. Maini, Analog Electronics, Khanna Publishing House, 2019
9. L.K. Maheswari, Analog Electronics, Laxmi Publications

Reference books

1. Nagchoudhuri , Microelectronic Devices, 1/e, Pearson Education, 2001
2. Natarajan, Microelectronics: Analysis & Design, 1/e 2005, TMH
3. Maheshwari and Anand , Analog Electronics, PHI
4. Boyle'stead , Nashelsky: & Kishore, Electronic Devices & Circuit theory, 1/e, PHI/Pearson.
5. Millman & Halkias: Basic Electronic Principles; TMH.
6. Tobey & Grame – Operational Amplifier: Design and Applications, Mc Graw Hill.

Course Outcome: After completion of this course, the learners will be able to

1. describe analog electronic components and analog electronics circuits
2. explain principle of operation of analog electronic components, filters, regulators and analog electronic circuits.
3. compute parameters and operating points of analog electronic circuits.
4. determine response of analog electronic circuits.
5. distinguish different types amplifier and different types oscillators based on application.
6. construct operational amplifier based circuits for different applications.

Special Remarks: