	National Institute of Technology Meghalaya An Institute of National Importance	CURRICULUM

Programme	**Bachelor of Technology in Electrical and Electronics Engineering**	Year of Regulation	**2013-14**
Department	**Electrical Engineering**	Semester	**III**

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total
EE201	**Analog Electronics**	**3**	**1**	**0**	**4**	**50**	**50**	**100**	**200**

Course Objectives	Course Outcomes		
To understand the semiconductor materials and working principal for semi-conductors devices to design diode and transistors circuits		CO1	Able to understand the concepts of semiconductor material, carrier formation, and diode properties and applications
To introduce the characteristic, specifications, IC specifications, open loop gain, negative feedback and gain computation in different configurations of operational amplifier.		CO2	Able to construct the semiconductor transistors BJT, JFET, MOSFET, and understand the characteristic for different circuits
To teach the frequency response analysis and different compensation network to obtain stability of Op-amp circuits with the application of Op-amp circuit as active filters and oscillators.		CO3	Able to understand ideal operational amplifier, characteristic, biasing and offset analysis. Negative feedback in op-amp circuits. Inverting, and non-inverting configurations.
To analyse the applications of Op-amp circuit as active filters and oscillators.		CO4	Able to acquire knowledge on frequency response, Compensation and stability of Op-amp circuits with the application of Op-amp circuit as active filters and oscillators.
To design and analyze various linear and non-linear applications of Op-amp circuits.		CO5	Able to design and analyze some linear and non-linear applications of Op-amp.

No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	**2**	**2**	**2**	**2**	**1**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**1**	**1**
2	CO2	**2**	**3**	**3**	**3**	**2**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**2**	**2**	**2**
3	CO3	**2**	**2**	**0**	**2**	**3**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**3**	**2**	**3**
4	CO4	**2**	**2**	**0**	**2**	**3**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**3**	**2**	**3**
5	CO5	**2**	**2**	**0**	**2**	**2**	**2**	**0**	**0**	**1**	**0**	**0**	**1**	**3**	**2**	**3**

SYLLABUS

No.	Content	Hours	COs
I	**Unit 1: Fundamental of Analog Electronic Devices:** Solid state device fundamentals, BJT and FET configuration and analysis, bypass and coupling capacitors, biasing methods, stability, common base configuration analysis, emitter follower, common source amplifier, frequency response of BJT and FET amplifiers.	**18**	**CO1** **CO2**
II	**Unit 2: Operational Amplifier** Introduction of op-amp, operational amplifier configuration, block diagram representation, schematic symbol, ICs and manufacturers designations, device identification, open-loop op-amp configuration, op-amp negative feedback, series-and-shunt configurations, difference amplifiers, offset analysis, common mode and differential mode gains, CMRR, compensating network, frequency response of compensated and non-compensated op-amp, slew rate, frequency response, GBW product, phase margin, biasing technique, error compensation	**13**	**CO3** **CO4**
III	**Unit 3: Linear Applications** DC and AC amplifiers, peak amplifier, summing, scaling and averaging amplifiers, instrumentation amplifier, voltage-to-current converter, current-to-voltage converter, integrator and differentiator circuits	**05**	**CO3** **CO5**
IV	**Unit 4: Filters and Oscillators** Active filters design, high order filter, low pass, band pass, high pass, and band reject filters, and all pass filter, oscillators, phase shift oscillator, and Wien bridge oscillators, quadrature oscillator, square, triangular and saw tooth wave generators, voltage controlled oscillator	**07**	**CO3** **CO4**
V	**Unit 5: Comparators and Converters** Zero-crossing detector, schmitt trigger, voltage limiters and window detector, voltage-to-frequency and frequency-to-voltage converters, analog-to-digital and digital-to-analog converters, clippers clampers, peak detector, sample-and-hold circuit. The 555 timer, phase-locked loop, power amplifier, voltage regulators and application, audio function generator	**07**	**CO5**
	Total Hours	**50**	

Essential Readings

1. Sedra and Smith, "Microelectronic Circuits", Oxford University Press, 5th Edition, 2004
2. Gayakwad Ramakant, "Op-Amps and Linear Integrated Circuits", PHI, 4th Edition, 2002.
3. Robert L. Boylestad, "Electronic Devices and Circuit Theory," Pearson, 10th Edition, 2009

Supplementary Readings

1. Jacob Millman and C. C. Halkias, "Integrated Electronics: Analog and Digital Circuits and Systems," McGraw-Hill Kogakusha, 2nd Edition, 2011.
2. P. Gray, P. Hurst, S. Lewis, and R. Meyer, "Analysis & Design of Analog Integrated Circuits," Wiley, 4th Edition, 2001.