

ANALOG ELECTRONICS

III Semester: EEE																				
Course Code	Category	Hours / Week			Credits	Maximum Marks														
AECB02	Core	L	T	P	C	CIA	SEE	Total												
		3	1	-	4	30	70	100												
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil			Total Classes: 60															
<p>I. COURSE OVERVIEW: This course introduces the fundamentals and principles of semiconductor devices and circuits. Apply the characteristics of diodes, bipolar, uni-polar transistors and operational amplifiers for designing rectifiers, clippers, clampers, amplifiers, oscillators and waveform generators. It provides skills for analyzing amplifier circuits using small signal model and hybrid pi model.</p> <p>II. OBJECTIVES: The course should enable the students to:</p> <p>I The operational principles of analog electronic circuits such as feedback amplifiers and operational amplifiers.</p> <p>II The analog circuits fundamental theory to build signal conversion circuits, filter circuits, Data converters and Automatic Gain Control.</p> <p>III The analog circuits applications in the advanced fields power electronics such as power factor monitoring circuits, power quality measurement, SMPS and battery controls..</p> <p>III. COURSE OVERVIEW: After successful completion of the course, students should be able to:</p> <p>CO 1 Demonstrate the principle of operation of pn diode for the diode applications Understand such as rectifiers, clippers, and clampers.</p> <p>CO 2 Illustrate the principle of operation of bipolar and uni polar transistor for Understand operating in different regions of operation.</p> <p>CO 3 Explain differential amplifiers and power amplifiers using transistor high Understand frequency model.</p> <p>CO 4 Estimate feedback amplifiers parameters based on sampling and mixer circuits. Apply</p> <p>CO 5 Calculate frequency of oscillations for the RC, LC, Hartley and Colpits Apply oscillators.</p> <p>CO 6 Utilize inverting and non inverting amplifiers as waveform generators and in IC Understand related real time applications.</p> <p>IV. SYLLABUS:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">MODULE-I</td> <td style="width: 65%;">DIODE CIRCUITS</td> <td style="width: 20%; text-align: right;">Classes:09</td> </tr> <tr> <td colspan="3">P-N junction diode, I-V characteristics of a diode; review of half-wave and full-wave rectifiers, clamping and clipping circuits. Input output characteristics of BJT in CB, CE, CC configurations, biasing circuits, Load line analysis, common emitter, common base and common collector amplifiers; Small signal equivalent circuits.</td> </tr> <tr> <td>MODULE-II</td> <td>MOSFET CIRCUITS</td> <td style="text-align: right;">Classes: 09</td> </tr> <tr> <td colspan="3">MOSFET structure and I-V characteristics. MOSFET as a switch. small signal equivalent circuits - gain, input and output impedances, small-signal model and common-source, common-gate and common-drain amplifiers, trans conductance, high frequency equivalent circuit.</td> </tr> </table>									MODULE-I	DIODE CIRCUITS	Classes:09	P-N junction diode, I-V characteristics of a diode; review of half-wave and full-wave rectifiers, clamping and clipping circuits. Input output characteristics of BJT in CB, CE, CC configurations, biasing circuits, Load line analysis, common emitter, common base and common collector amplifiers; Small signal equivalent circuits.			MODULE-II	MOSFET CIRCUITS	Classes: 09	MOSFET structure and I-V characteristics. MOSFET as a switch. small signal equivalent circuits - gain, input and output impedances, small-signal model and common-source, common-gate and common-drain amplifiers, trans conductance, high frequency equivalent circuit.		
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MODULE-III	MULTI-STAGE AND POWER AMPLIFIERS	Classes: 09
<p>Classification of Amplifiers, Distortion in amplifiers, Different coupling schemes used in amplifiers, Frequency response and Analysis of multistage amplifiers, Cascade amplifier, Darlington pair.</p> <p>Transistor at High Frequency: Hybrid - model of Common Emitter transistor model, f_{α}, β and unity gain bandwidth, Gain band width product. Differential Amplifiers, Power amplifiers - Class A, Class B, Class C, Class AB.</p>		
MODULE-IV	FEEDBACK AMPLIFIERS	Classes: 09
<p>Concepts of feedback: Classification of feedback amplifiers, general characteristics of Negative feedback amplifiers, effect of feedback on amplifier characteristics, voltage series, voltage shunt, current series and current shunt feedback configurations, simple problems; Oscillators: Condition for Oscillations, RC type Oscillators RC phase shift and Wien-bridge Oscillators, LC type Oscillators, generalized analysis of LC Oscillators, Hartley and Colpitts oscillators.</p>		
MODULE-V	OPERATIONAL AMPLIFIERS	Classes: 09
<p>Ideal op-amp, Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product, Inverting and non-inverting amplifier, Differentiator, integrator, Square-wave and triangular-wave generators</p>		
Text Books:		
<ol style="list-style-type: none"> 1. Jacob Millman, Christos C Halkias, "Integrated Electronics", McGraw Hill Education, 2nd Edition 2010. 2. Ramakanth A, Gayakwad, "Op-Amps & Linear Ics", PHI, 2003. 		
Reference Books:		
<ol style="list-style-type: none"> 1. Electronic Devices Conventional and current version -Thomas L. Floyd 2015, pearson. 2. J. Millman and A. Grabel, "Microelectronics", McGraw Hill Education, 1988. 3. P. Horowitz and W. Hill, "The Art of Electronics", Cambridge University Press, 1989. 4. P. R. Gray, R. G. Meyer and S. Lewis, "Analysis and Design of Analog Integrated Circuits", John Wiley & Sons, 2001. 		
Web References:		
<ol style="list-style-type: none"> 1. http://www-mdp.eng.cam.ac.uk/web/library/enginfo/electrical/hong1.pdf 2. https://archive.org/details/ElectronicDevicesCircuits 3. http://nptel.ac.in/courses/Webcourse-contents/IIT-ROORKEE/BASIC-ELECTRONICS/home_page.htm 4. www.nptel.ac.in 5. notes.specworld.in/pdc-pulse-and-digital-circuits 		
E-Text Books:		
<ol style="list-style-type: none"> 1. http://services.eng.uts.edu.au/pmcl/ec/Downloads/LectureNotes.pdf 2. http://nptel.ac.in/courses/122106025/ 3. http://www.freebookcentre.net/electronics-ebooks-download/Electronic-Devices-and-Circuits-(PDF-313p).html 4. http://www.introni.it/pdf/Millman-Taub-Pulse-and-Digital-Switching-Waveforms-1965.pdf 5. https://www.jntubook.com/pulse-digital-circuits-textbook-free-download/ 		

