ECE105: Basic Electronics

Programme: B.Tech.	Year: I	Semester: Odd
Course : Core for CCE, CSE, ECE and ME	Credits : 4	Hours : 40 + 10

Course Context and Overview (100 words):
The objective of the course is that student would appreciate the significance of signal processing in different applications. Understand and apply different Network analysis theorems to analyze and design the circuits. Student would be able to analyze time and frequency domain characteristics of systems. Compile the different building blocks in digital electronics using logic gates and implement simple logic function using basic universal gates.

Prerequisites Courses: NIL

Course outcomes(COs):

On completion of this course, the students will have the ability to:
CO1: Know the basics of Circuits analysis and Design
CO2: Analyse different circuits using different network Theorems
CO3: Analyze time and frequency domain characteristics of networks.
CO4: Analyse and design Op-Amp based circuits
CO5: Convert from one number system to other and perform computations in various number systems.
CO6: Minimize the Boolean expressions using Boolean algebra, K maps and QM method.

Course Topics:

Topics	Lecture Hours	
UNIT - I **1. Topic** Network Theorems	10	10
1.1 Basic definitions, passive components, sources, DC and AC, circuit analysis (analysis through network simplification)	3	
1.2 - nodal analysis, loop analysis, superposition theorem, Thevenin's Theorem, Norton's Theorem,	4	
1.3 Maximum Power Transfer Theorem, Reciprocity Theorem).	3	
UNIT - II **2. Topic** AC circuit Analysis	10	10
2.1 Time domain response of RC and RL circuits.	3	
2.2 Sinusoidal steady state, Phasor, Impedance Frequency-domain response of RC, RL, and RLC circuits.	4	

2.3	Power in A.C. Circuits, D.C. Power supplies	3	
UNIT - III **3.** **Topic** Operational Amplifiers		7	7
3.1	Inverting Op-Amp and Circuits	3	
3.2	Filter design with Op-Amp	2	
3.3	Positive feedback	2	
UNIT - IV **4.** **Topic** Number Systems and Boolean Algebra		6	6
4.1	Binary, and other number systems	3	
4.2	Boolean algebra and optimization methods	3	
UNIT-V **5.** **Topic** Digital Circuits		7	7
5.1	Combinational Circuits, Adder, subtractor, decoder, encoder, MUX	3	
5.2	Sequential circuits	2	
5.3	Parity check in digital signals	2	

Textbook references (IEEE format):
Text Book:
1.   Leonard S Bobrow, *"Foundation of Electrical Engineering",* Oxford University Press.
2.   Sedra and Smith, "*Microelectronic Circuits"*, Oxford University Press.
3.   A. Ramkalyan, "*Linear Circuits Analysis and Synthesis"*, Oxford University Press, 2005.
4.   D. R. Cunningham and J. A. Stuller, "*Basic Circuit Analysis"*, published by Jaico Publishing House, Mumbai, 1996.
5.   M. Morris Mano, *"Digital Design":* Prentice Hall

Reference books:
1.   Herbert Taub and Donald Schilling, "*Digital Integrated Electronics"*, McGraw Hill, New York, 1977.

Additional Resources (NPTEL, MIT Video Lectures, Web resources etc.):
1.   *http://www.nptel.ac.in/courses/Webcourse-contents/IIT-ROORKEE/BASIC-ELECTRONICS/home_page.htm*
2.   *http://nptel.ac.in/video.php?subjectId=117103063*

Evaluation Methods:

Item	Weightage (%)
Quizzes	30
Midterm	30
Final Examination	40

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