Master of Science (Electronics)
M.Sc. (Electronics) Semester I

Course Code	PS01CELE52	Title of the Course	Applications of ICs And Fuzzy Electronics
Total Credits of the Course	4	Hours per Week	3+1=4 Hours

Course Objectives:	1. To impart the knowledge of some important applications of Operational Amplifier (OP AMP) 2. To make students expert of Filter Designing. 3. To make learners know about the applications of Phase Locked Loop 4. To impart training of Spice- pSPice and LTSpice. 5. To introduce the learners to Fuzzy Logic, Fuzzy set theory, Fuzzy Circuits. 6. To provide an introduction to Artificial Neural Network systems.

Course Content		
Unit	Description	Weightage* (%)
1.	Review of basic Op Amp Application- Instrumentation Amplifier, Active Filters: Introduction, Classification, First Order Active Filters, Standard Second Order Responses, Second-order Low Pass, High Pass, Band Pass and Notch Filters, State-Variable and Biquad filters.	25
2.	Audio Filter Applications- Equalizer and Tone control Circuit, Higher-Order Filters- Butterworth Response, Chebyshev Response, Elliptical Response, Bessel Response, Higher-Order Filter Design, Cascade Design, Generalized Impedance Converters, RLC Ladder Simulation Design, Filter Sensitivity, OP Frequency Response.	25
3.	Phase Locked Loops: Operating principles of the PLL, Major building Blocks of the PLL, Typical Monolithic PLL ICs, Applications of the PLL - Frequency Multiplier and FSK Demodulator Simulation of Circuit using Spice: Introduction to pSpice/LTSpice, Circuit Descriptions, DC Circuit Analysis, Transient Analysis, AC Circuit Analysis, Analysis of OP AMP Circuits	25
4.	Introduction to Fuzzy Electronics: Fuzzy sets, Basic Concepts, Operations on Fuzzy Sets, Algebraic Operations, Fuzzy relations, Geometrical Illustration, Fuzzy Logic, Fuzzy Algebra, Truth Tables, Fuzzy Functions. Concepts of Fuzzy Logic Circuits, Fuzzy Flip- flops, Fuzzy Logic Circuits in Current Mode, Fuzzy Numbers,Electronic Neural Network: Introduction, The Biological System, Learning Algorithms, Neural Network Models.	25

Teaching-Learning Methodology	Classroom Teaching (Offline/Online), Software based learning, learning from online resources, practicals

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the applications of linear ICS.
2.	Have thorough understanding of the working of various types of Filters and will be able to design first order, second order and higher order active filter circuits for different applications.
3.	Understand the working of PLL and its applications. get an idea of computer aided designs and simulation of circuits using pSPICE and LT Splice.
4.	Have an idea of the Fuzzy System and Neural Network and the functioning of Artificial Intelligent systems.

Suggested References:	
Sr. No.	References
1.	Design with operational Amplifiers and Analog Integrated Circuits Sergio Franco (1988), McGraw-Hill Book Company, N.Y., USA
2.	Integrated Circuits K.R. Botkar (1987), Khanna Publishers, New Delhi, INDIA
3.	SPICE for Circuits and Electronics using pSPICE Muhammad Rashid (1999) (2nd ed.), Khanna Publishers

4.	Introduction to applied Fuzzy Electronic Ahmad M. Ibrahim (1999), Prentice- Hall of India Pvt. Ltd., New Delhi, INDIA
5.	Op-Amps and Linear Integrated Circuits Ramakant A. Gayakwad (2015) (4th ed.),Prentice- Hall of India Pvt. Ltd., New Delhi, INDIA
6.	Applications and Design with Analog Integrated Circuits J. Michael Jacob (1993) (2nd ed.), Prentice- Hall Inc.,N.Y., USA

On-line resources to be used if available as reference material
On-line Resources
1. https://www.circuitstoday.com/instrumentation-amplifier
2. http://www.ieca-inc.com/images/Spice-Simulation_Using_LTspice_Part_1.pdf

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