PROPOSED SCHEME OF COURSE WORK

Course Details:

Course Title	**: LINEAR AND DIGITAL IC APPLICATIONS**		
Course Code	**: 13EC1146**	**L T P C**	**: 4 0 0 3**
Program:	**: B.Tech.**		
Specialization:	**: Electrical and Electronics Engineering**		
Semester	**: V**		
Prerequisites	**:Basic Network Analysis, Pulse & Digital Circuits, Switching Theory and Logic Design**		
Courses to which it is a prerequisite	**: -**		

Course Outcomes (COs):

At the end of the course the student will be able to

1	Extrapolate the characteristics and applications of Op –Amp
2	Justify the applications of Timers and PLL's.
3	Design different types of A-D and D-A Converters.
4	Compare the performance of different logic families.
5	Design different combinational and sequential circuits using Digital IC's.

Program Outcomes (POs):

The graduate of Electrical and Electronics Engineering will be able to:

1	Apply the knowledge of basic sciences and electrical and electronics engineering fundamentals to solve the problems of power systems and drives.
2	Analyze power systems that efficiently generate, transmit and distribute electrical power in the context of present Information and Communications Technology.
3	Design and develop electrical machines and associated controls with due considerations to societal and environmental issues.
4	Design and conduct experiments, analyze and interpret experimental data for performance analysis.
5	Apply appropriate simulation tools for modeling and evaluation of electrical systems.
6	Apply the electrical engineering knowledge to assess the health and safety issues and their consequences.
7	Demonstrate electrical engineering principles for creating solutions for sustainable development.
8	Develop a techno ethical personality that help to serve the people in general and Electrical and Electronics Engineering in particular.
9	Develop leadership skills and work effectively in a team to achieve project objectives.
10	Communicate effectively in both verbal and written form.
11	Understand the principles of management and finance to manage project in multi-disciplinary environments.
12	Pursue life-long learning as a means of enhancing the knowledge and skills.

Course Outcome Vs Program Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1		M		M				M				
CO-2	S	M		M				M				
CO-3		M						M				
CO-4	M			S								
CO-5		M		M				M				

S - Strongly correlated, *M* - *Moderately* correlated, *Blank* - *No correlation*

Assessment Methods:	Assignment / Quiz / Seminar / Mid-Test / End Exam

Teaching-Learning and Evaluation

Week	TOPIC / CONTENTS	Course Outcomes	Sample questions	TEACHING - LEARNING STRATEGY	Assessment Method
1	Unit-1 Introduction, Op-Amp Block Diagram, Characteristics of OP-Amps, ideal and practical Op-Amp specifications, Inverting and Non-inverting amplifier	CO1	Q1-Draw the block diagram of internal construction of op-amp, and explain the function of each block in details. Q2- Explain the ideal characteristics of an opamp and why open loop op-amp configuration is not used in linear applications	Lecture Discussion	Assignment I/Quiz-I/Mid-I
2	DC and AC characteristics of 741 opamps	CO1	Q1-Definethefollowing electrical parameters: Input offset voltage, CMRR, input bias current, slew rate, Power supply rejection ratio. Q2-Explain Dominant Pole Frequency Compensation Technique	Lecture Discussion	Assignment I/Quiz-I/Mid-I
3	Instrumentation amplifier, Voltage to current and current to Voltage converters,	CO1	Q1- Design a practical integrator to properly process input sinusoidal waveforms up to 1kHz. The input amplitude is 10Mv.	Lecture Design	Assignment I/Quiz-I/Mid-I
	Integrator and differentiator		Q2. Design a differentiator an input signal that varies in frequency from 10 Hz to 1kHz.if a sine wave peak at 1000Hz is applied to this differentiator. Draw the output waveform.		
4	Integrator, Comparators and its Applications, Schmitt Trigger	CO1	Q1-Design a Schmitt trigger whose VLT and VUT are ±5v. Draw its waveform. Q2-Differenate between Op-Amp as Comparator and Op-Amp as Schmitt Trigger	Lecture Design	Assignment I/Quiz-I/Mid-I
5	Multivibrators, Triangular and Square wave generators	CO1	Q1-DesignaMonostable Mutivibrator using 555 Timer with a pulse width of 1ms. Q2-Design a triangular wave generator so that fo -1KHz , Vo(pp)=5V and the op-amp supply voltage ±15v. draw the	Lecture Design	Assignment I/Quiz-I/Mid-I

			circuit diagram and its waveforms.		
6	Voltage regulators Unit-3 Introduction, basic DAC techniques, weighted resistor DAC	CO1, CO3	Q1- Explain the operation of IC723 Voltage Regulator and what are its advantages. Q2: With the help of circuit Diagram Explain the operation of R-2R Ladder DAC	Lecture Problem Solving	Assignment I/Quiz-I/Mid-I
7	R-2R ladder DAC, Inverted R-2R DAC and IC 1408 DAC Different types of ADCs - parallel comparator type ADC, counter type ADC	CO3	Q1: A 5-bit D/A converter is available. Assume that '00000' corresponds to an output of +10V and that the D/A converter is connected for -0.1V per increment, What output voltage will be produced for '11111'? Q2: With the help of circuit Diagram Explain the operation of inverted R-2R Ladder DAC. Q3: With the help of circuit Diagram Explain the operation of counter type of ADCs	Lecture	Assignment I/Quiz-I/Mid-I
8	successive approximation ADC, Dual slope ADC. DAC and ADC Specifications	CO3	Q1: With the help of circuit Diagram explain the operation of Dual Slope ADC. Q2: How many levels are possible in a two-bit DAC? What is its resolution if the output range is 0 to 3V?. Q3: Explain stability, conversion	Lecture Discussion	Assignment I/Quiz-I/Mid-I
			time terms related to DAC		
9	MID TEST-1	CO1, CO3			
10	Unit-2 Introduction to 555 timer, functional diagram, Monostable and Astable operations and applications	CO2	Q1: Explain the operation of 555 Timer as an Astable Multivibrator and derive an expression for time period of the waveform. Q2-Design a Monostable Multivibrator using 555 Timer with a pulse width of 1 ms	Lecture Design	Assignment II/Quiz-II/Mid-II
11	Astable applications 555 timer as Schmitt Trigger PLL - introduction block schematic, principles and description of individual blocks, 565 PLL.	CO2	Q1:Explain how FSK is Generated using 555 Timer Q2:Explain about the Block Diagram of PLL	Lecture Discussion	Assignment II/Quiz-II/Mid-II
12	Unit-IV		Q1: Design a 4-input CMOS	Lecture	Assignment

	Classification of Integrated circuits, NMOS, PMOS & CMOS. Compound CMOS Gates	CO4	ORAND-INVERT gate. Explain the circuit with the help of logic diagram and function table? Q2: Design f = (A+BC)' using CMOS logic.	Design	II/Quiz-II/Mid-II
13	tri-state device, standard RTL, ECL, TTL NAND Gate	CO4	Q1: Design & Explain the operation of 2-input NAND gate using RTL. Q2: Draw the circuit diagram of basic TTL NAND gate and explain the three parts with the help of functional operation.	Lecture Design	Assignment II/Quiz-II/Mid-II
14	comparison of various logic families, Unit-V Design using Digital ICs: multiplexers, Demultiplexers, decoders, Encoder,	CO4, CO5	Q1:Compare CMOS, TTL and ECL with reference to logic levels, D.C noise margin, propagation delay and fan-out Q2: Design 5 to 32 decoder using 3 to 8 decoders.	Lecture Design	Assignment II/Quiz-II/Mid-II
15	priority Encoder, Flip-flops & their conversions, Design of synchronous counters,	CO5	Q1:Convert JK Flip-Flop to T Flip-Flop Q2:What is difference between Priority Encoder and Encoder	Lecture Design	Assignment II/Quiz-II/Mid-II
16	Design of synchronous counters, Decade counter,	CO5	Q1:Design 4 bit up counter using JK Flip-Flop Q2:Design a Mod-8 Counter using 7476	Lecture Design	Assignment II/Quiz-II/Mid-II
17	shift registers	CO5	Q1-Design a Parallel in Serial Out Shift Register using 7474 Q2-Design a Counter using 74194	Lecture Design	Assignment II/Quiz-II/Mid-II
18	**MID TEST – 2**	CO2, CO4, CO5			
19/20	**END EXAM**	CO1, CO2, CO3, CO4, CO5			