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):

A 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			S								
CO-2	M			S				S				
CO-3	M	M		S				S				
CO-4	M			S								
CO-5	M			S				S				

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- Define the following 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- Design a Monostable 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 circuit diagram and its waveforms.	▫ Lecture ▫ Design	Assignment I/Quiz-I/Mid-I
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 Classification of Integrated circuits, NMOS, PMOS & CMOS. Compound CMOS Gates	CO4	Q1: Design a 4-input CMOS ORAND-INVERT gate. Explain the circuit with the help of logic diagram and function table? Q2: Design f = (A+BC)' using CMOS logic.	▫ Lecture ▫ Design	Assignment 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			