

University of Technology

Computer Engineering Department

Academic Year 2023 - 2024

Second Year – First Semester – Digital Electronics - All Branches



CE231

2 Units - 2 Hours Per Week

Contents of Syllabus	Hours
Synchronous sequential circuits. <ul style="list-style-type: none">• Basic definition.• Analysis of sequential circuits.• Mealy machine and Moor machine.• Design of synchronous sequential circuits.	6h
Algorithmic state machines. <ul style="list-style-type: none">• ASM chart.• Principal component of an ASM chart.• Conversion of a state diagram to ASM chart.• Design by using JK flip-flops, D flip-flops, one flip-flop per state, multiplexers, and PLA	8h
Asynchronous sequential logic. <ul style="list-style-type: none">• Analysis procedure - Derivation of primitive flow table.• Reduction of primitive flow table.• Cycles and races.• Hazards.• Design examples	8h
Operational amplifiers. <ul style="list-style-type: none">• Introduction.• Non-inverting Op-Amp.• Inverting Op-Amp.• Voltage follower.• Voltage adder.• Integrator.• Differentiator.• Differential. Input amplifier	8h
D/A and A/D Converters. <ul style="list-style-type: none">• Variable resistor network.• D/A converters.• Resistive divider DAC.• Binary ladder DAC.• DAC accuracy and resolution.• A/D Converters.	8h

<ul style="list-style-type: none"> • Simultaneous ADC. • Counter-type ADC. • Continuous ADC. • Successive approximation ADC 	
Logic families (CMOS, TTL, ECL) <ul style="list-style-type: none"> • Propagation delay, • Switching speed limitations, power dissipation, fan-in/fan out constraints 	6h
Programmable logic devices. <ul style="list-style-type: none"> • PLD advantages. • ROM as PLD. • PLA and PAL. • Sequential programmable devices. • Sequential PLD (SPLD). • Complex PLD (CPLD). • Field-Programmable Gate Array (FPGA). • Generic array logic device (GAL). • Mega PAL. • Hard Array Logic (HAL). 	8h
Introduction to VHDL. <ul style="list-style-type: none"> • The main features of VHDL. • Design units. • Structural modeling. • Data flow modeling. • Behavioral modeling. • Mixed style of modeling. • Concurrent vs Sequential. • Components and Packages. • Functions and procedures. • VHDL simulation. • VHDL synthesis 	8h

References:

1. Shiv Shanker "Digital Circuit and Systems II " ,2009
2. M. Morris Mano "Digital Design "four edition , 2007