

NORTHERN TECHNICAL UNIVERSITY — MOSUL TECHNICAL INSTITUTE

Department of Electronic & Communication Techniques — Second Year Course Description

1. Electronic Circuits & Devices — Total: 60 Hours (Theory + Practical)

WEEK	THEORETICAL SYLLABUS CONTENT	LABORATORY EXPERIMENTS & PRACTICE
Week 1	Semiconductor Physics, P-N Junction properties, and Diode Equivalent Circuits.	Diode Forward & Reverse V-I Characteristics
Week 2	Half-Wave and Full-Wave (Center-Tap & Bridge) Rectifier Circuits.	Rectifier Waveforms & Ripple Voltage Measurement
Week 3	Filter Circuits (Capacitor Filter, LC Filter) and Zener Diode Voltage Regulation.	Zener Diode Line and Load Regulation Lab
Week 4	Bipolar Junction Transistors (BJT): Construction, NPN/PNP Types, and Configurations.	BJT Input and Output Characteristics Plotting
Week 5	BJT Biasing Methods: Fixed Bias, Emitter Bias, and Voltage Divider Bias.	DC Biasing Point (Q-Point) Measurement Lab
Week 6	Small-Signal BJT Amplifiers: AC Analysis and Hybrid Equivalent Models.	Common Emitter Amplifier AC Gain Measurement
Week 7	Field Effect Transistors (JFET & MOSFET): Structure and Operating Principles.	JFET Drain and Transfer Characteristics
Week 8	MOSFET Biasing Circuits and Small-Signal Amplification.	MOSFET Amplifier Testing and Analysis
Week 9	Operational Amplifiers (Op-Amp): Ideal Characteristics and Inverting/Non-Inverting Configurations.	Op-Amp Basic Circuits (Inverting/Non-Inverting)
Week 10	Op-Amp Mathematical Applications: Summing, Difference, Integrator, and Differentiator.	Op-Amp Integrator and Differentiator Testing
Week 11	Feedback Amplifiers: Voltage/Current Series and Shunt Feedback Types.	Negative Feedback Amplifier Performance Lab
Week 12	Oscillators: Sinusoidal Oscillators (RC Phase Shift, Wien Bridge, LC Oscillators).	RC Phase Shift & Crystal Oscillator Testing
Week 13	Power Amplifiers: Class A, Class B Push-Pull, Class AB, and Class C Amplifiers.	Class B Push-Pull Amplifier Efficiency Lab
Week 14	Active Filters: Low-Pass, High-Pass, Band-Pass, and Band-Stop Active Filter Designs.	Active Low-Pass and High-Pass Filter Measurements
Week 15	Voltage Regulators: IC Regulators (78XX, 79XX, LM317) and Protection Circuits.	Adjustable Voltage Regulator Circuit Assembly

2. Digital Systems & Microprocessors — Total: 60 Hours (Theory + Practical)

WEEK	THEORETICAL SYLLABUS CONTENT	LABORATORY EXPERIMENTS & PRACTICE
Week 1	Number Systems (Binary, Octal, Decimal, Hexadecimal) and Codes (BCD, Gray Code).	Logic Gate ICs Identification and Verification
Week 2	Boolean Algebra, De Morgan's Theorems, and Logic Expression Simplification.	Combinational Logic Circuit Minimization Lab
Week 3	Karnaugh Maps (K-Map) Optimization (2, 3, and 4 variables).	K-Map Based Circuit Implementation
Week 4	Combinational Logic Circuits: Adders (Half/Full), Subtractors, and BCD Adders.	Full Adder and Subtractor Circuit Testing
Week 5	Multiplexers (MUX), Demultiplexers (DEMUX), Decoders, and Encoders.	MUX and Decoder Application Experiments
Week 6	Sequential Logic: Latches and Flip-Flops (SR, JK, D, T Flip-Flops).	Flip-Flop Characteristic Tables Verification
Week 7	Registers and Shift Registers (SISO, SIPO, PISO, PIPO).	Shift Register IC Applications
Week 8	Counters: Asynchronous (Ripple) and Synchronous Counters Design.	Up/Down Counter Circuit Assembly
Week 9	Microprocessor Architecture Overview: 8085/8086 Internal Registers & Bus System.	Microprocessor Trainer Kit Introduction
Week 10	Addressing Modes and Instruction Set of 8085/8086 Microprocessor.	Assembly Language Data Transfer Instructions
Week 11	Assembly Language Programming: Arithmetic and Logic Operations.	Assembly Programs for Addition and Logic Tests
Week 12	Branching, Looping, and Subroutines in Assembly Language.	Assembly Loop and Array Processing Programs
Week 13	Memory Interfacing: RAM/ROM Address Decoding and Interface Circuits.	Memory Address Decoding Lab Exercises
Week 14	Programmable Peripheral Interface (PPI 8255) Interfacing.	PPI 8255 I/O Port Control Experiments
Week 15	Interrupt Handling, ADC/DAC Interfacing, and Practical Applications.	ADC Interfacing and Signal Measurement Test