

Faculty of Engineering & Technology

Electronics

Information :

Course Code : ELE 213

Level : Undergraduate

Course Hours : 4.00- Hours

Department : Department of Electrical Engineering

Instructor Information :

Title	Name	Office hours
Associate Professor	Hesham Nabil Mohamed Ahmed	
Assistant Lecturer	Mostafa Mohamed Salaheldin Abdelkhalek	4

Area Of Study :

- Describe the physical and basic principles of semiconductor diodes, BJT, and FET.
- Analysis of diode circuits and their different applications.
- Understand the analysis of single-stage amplifier circuits using FET & BJT.
- Train the student to perform experiments on electronic circuits using electronic laboratory and software tools for circuit design and simulation.

Description :

Semiconductor diode (theory of the P-N junction, I-V characteristics, junction potential, forward and reverse biased P-N junction, diffusion capacitance), Diode models. Diode circuit applications (rectifier circuits, voltage doublers, clipping circuits), Special diodes: Zener diode, Schottky barrier diodes, Light emitting diodes (LED), and photodiodes. Bipolar Junction Transistor (BJT), Static and dynamics characteristics, Field Effect Transistor (FET), linear, nonlinear and pinch off regions, Junction Field Effect Transistor (JFET) and Metal Oxide Semiconductor Field Effect Transistor (MOSFET): physical structure, basic configurations, the I-V characteristics, FETs applications: MOSFET as a resistance, JFET as a constant current source, Single stage amplifiers (biasing, small signal models). Other semiconductor devices.

Course outcomes :

a.Knowledge and Understanding: :

1 -	Describe the basic principles of semiconductor diodes.
2 -	Determine the different applications of the diode circuits.
3 -	Recognize the basic principles of semiconductor FET transistors.
4 -	Describe the single-stage amplifier circuits using FET transistors and their applications.
5 -	Define the basic principles of semiconductor BJT transistors.
6 -	Describe the single-stage amplifier circuits using BJT transistors and their applications.

b.Intellectual Skills: :

1 -	Analyze problems related to the diode circuits and their different applications.
2 -	Analyze problems related to single-stage amplifier circuits and their applications.
3 -	Construct a comparison between different configurations of single-stage amplifier circuits.

c. Professional and Practical Skills: :

1 -	Apply theories and techniques of mathematics, basic electricity and electronics to solve electronic circuit problem.
2 -	Use computational facilities and related software tools, measuring instruments, workshops and/or relevant laboratory equipment to design and diagnosis experiments.
3 -	Read thoroughly datasheets and identify appropriate specifications for required device and circuits.

d. General and Transferable Skills: :

1 -	Collaborate effectively within multidisciplinary team
2 -	Communicate effectively.
3 -	Effectively manage tasks, time, and resources.
4 -	Search for information and engage in life-long self-learning discipline.

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Physics of semiconductors	6	3	3
PN-junction Ideal diode and actual Diode Characteristics.	6	3	3
Different applications of diodes: Rectifier circuits, Peak detectors, Limiter and clamper circuits, voltage doublers, Zener Diodes, and Special diodes	12	6	6
Amplification using FET transistors Biasing techniques Common Source Amplifier Common Drain Amplifier Common Gate Amplifier	18	9	9
Different applications of FET transistors	12	6	6
Amplification using BJT transistors Biasing techniques Common Emitter Amplifier Common Collector Amplifier Common Base Amplifier	18	9	8
Introduction to Electronics and Semiconductors	6	3	3
Different applications of BJT transistors and other devices	12	6	6

Teaching And Learning Methodologies :

Interactive Lecturing
Problem solving
Discussion
Experiential Learning

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
Final exam	40.00		
o Electronic and computer Lab Experiments	10.00		
o In Class Quizzes and participation	20.00		
o Mid-Term Exams	30.00		

Course Notes :

No course notes are required

Recommended books :

Adel S. Sedra, and Kenneth C. Smith, Microelectronic Circuits, Oxford University Press 7th Edition, 2014.