LAHORE COLLEGE FOR WOMEN UNIVERSITY

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Department of Electrical Engineering

Course Descriptive File

1	**Course Title**	Electronics Devices & Circuits
2	**Course Code**	EE
3	**Credit Hours**	4
4	**Pre-requisites**	Linear Circuit Analysis
5	**Co-requisites**	-
6	**Semester**	2
7	**Resource Person**	Dr. Muhammad Taskeen Raza
8	**Contact Hours (Theory)**	03
9	**Contact Hours(Lab)**	03
10	**Office Hours**	03
11	**Email**	mtaskeenraza@gmail.com
12	**Course Outline as per Scheme of Studies (SoS)**	

- **Semiconductor Devices**
  Semiconductor Diode Introduction, Semiconductors, Energy Levels, n-type and p-type materials, Semiconductor Diode, Characteristics of Diode, Diode Equivalent Circuits Transitions, Recovery, Specification, Notations, Testing of Diode, Zener Diode, Light Emitting Diodes, Numerical Problems
- **Diode Applications**
  Introduction, Load Line Analysis, Parallel and Series Configurations, Gates, Sinusoidals, Half Wave/Full Wave Rectifiers, Clipper and Clamper Circuits, Zener Diodes, Voltage-Multiplier Circuits and Applications, Numerical Problems
- **Bipolar Junction Transistors**
  Bipolar Junction Transistors Introduction, Bipolar Junction Transistors, Construction and Operation, and Amplification analysis, Common-Emitter, Common-Base and Common Collector Configurations of BJT, Limits of Operation, Specification, Testing, Casing and Terminal Identification of BJTs, Numerical Problems.
- **DC-Biasing-BJTs**
  Introduction, Operating Point, Fixed-Bias, Emitter Bias, Voltage Divider Bias Configurations, Collector Feedback , Emitter-Follower, Common-base and Miscellaneous Configurations, Design Operations, Current Mirror and Current Source Circuits, PNP Transistors, transistor Switching Networks, Bias Stabilization, Numerical Problems
- **BJT AC Analysis**
  Introduction, AC Domain, BJT Modeling, re-Model, CE-Fixed Configuration, Voltage Divider Bias, CE Emitter-Bias, Emitter-Follower, Common-Base, Collector Feedback and Collector Feedback Configurations, Current Gain, RL and RS, Two Port Systems, Cascaded Systems, Darlington and Feedback Pair, Hybrid Equivalent Model, Hybrid π Model, Variations of Transistor Parameter, Numerical Problems.

13	Course Objectives as per SoS

- After successful completion of this foundation course, students will be able to describe the knowledge and understanding of different semiconductor devices; diodes, transistors, and other switching devices. Students will be able to analyze the semiconductor devices based circuits and also able to design the circuits using these devices at preliminary level.

14	Books

Textbook

1. Electronics Principles, Alberto P Malvino ISBN: 978-007337388

Reference Books

1. Electronic Devices and Circuit Theory, H. Boylestad and L. Nashelsky, ISBN-10:0135026490
2. Electronic Devices, Thomas L. Floyd, ISBN-10: 0132359235

15	Course Learning Outcomes (CLOs)

After successful completion of this module, students will be able to describe the knowledge and understanding of:

Theory CLOs:

1. Describe and explain the basic construction, operation and characteristics of semiconductor devices
2. Apply the acquired knowledge to solve small scale circuits consisting of semiconductor devices
3. Illustrate dc and ac response of small signal amplifier circuits using device models

Lab CLOs

16	Marks Breakup

Theory

Quizzes	10%
Homework/assignments	10%
Midterm exam	25%
Terminal exam (3 hours)	30%
Total (theory)	**100%**

Lab

Lab Assessments	25%
2 Lab Sessional Exams (xx% Lab performance + xx% Lab Assessments)	15%
Lab Terminal Exam (xx% Lab performance + xx% Lab Assessments)	10%
Total (lab)	**100%**

Final marks	Theory marks * 0.75 + Lab marks * 0.25

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Week	Topic	CLO	Bloom Taxonomy	Specific Outcome	Contact Hours	Assessment	
1	Semiconductor Diode Introduction, Semiconductors, Energy Levels, n-type and p-type materials	CLO1	C2	Knowledge about Semiconductor devices	03	Assignment 1 Quiz 1	
2	Semiconductor Diode, Characteristics of Diode, Diode Equivalent Circuits	CLO1	C2	Knowledge about Semiconductor devices	03		
3	Transitions, Recovery, Specification, Notations, Testing of Diode	CLO1	C2	Knowledge about Semiconductor devices	03		
4	Zener Diode, Light Emitting Diodes, Numerical Problems.	CLO1	C2	Knowledge about Semiconductor devices	03		
5	Introduction, Load Line Analysis, Parallel and Series Configurations	CLO1	C2	Knowledge about Semiconductor Circuit analysis	03	Assignment 2 Quiz 2	
6	Gates, Sinusoidal, Half Wave/Full Wave Rectifiers,	CLO2	C3	Knowledge about Semiconductor based circuits	03		
7	Clipper and Clamper Circuits, Zener Diodes, Voltage-Multiplier Circuits and Applications, Numerical Problems.	CLO2	C3	Knowledge about Semiconductor based circuits	03		

8	Bipolar Junction Transistors Introduction, Bipolar Junction Transistors	CLO2	C3	Knowledge about Semiconductor devices	03		
9	Construction and Operation, and Amplification analysis, Common-Emitter	CLO2	C3	Knowledge about Semiconductor devices and Semiconductor based circuits analysis	03	Assignment 3 Quiz 3	
10	Common-Base and Common Collector Configurations of BJT, Limits of Operation	CLO2	C3	Knowledge about Semiconductor devices and Semiconductor based circuits analysis	03		
11	Specification, Testing, Casing and Terminal Identification of BJTs, Numerical Problems.	CLO2	C3	Knowledge about Semiconductor devices and Semiconductor based circuits analysis	03		
12	Introduction, Operating Point, Fixed-Bias, Emitter Bias, Voltage Divider Bias Configurations, Collector Feedback , Emitter-Follower, Common-base and Miscellaneous Configurations	CLO3	C3	Knowledge about Semiconductor devices and Semiconductor based circuits analysis	03		
13	Design Operations, Current Mirror and Current Source Circuits, PNP Transistors, transistor Switching Networks, Bias Stabilization, Numerical Problems	CLO3	C3	Knowledge about Semiconductor devices and Semiconductor based circuits analysis	03		

14	Introduction, AC Domain, BJT Modeling, re-Model, CE-Fixed Configuration, Voltage Divider Bias, CE Emitter-Bias, Emitter-Follower, Common-Base, Collector Feedback and Collector Feedback Configurations,	CLO3	C3	Knowledge about Semiconductor devices and Semiconductor based circuits analysis	03	Assignment 4 Quiz 4	
15	Current Gain, RL and RS, Two Port Systems, Cascaded Systems, Darlington and Feedback Pair, Hybrid Equivalent Model, Hybrid π Model, Variations of Transistor Parameter, Numerical Problems	CLO3	C3	Knowledge about Semiconductor devices and Semiconductor based circuits analysis	03		

18	Course Learning Outcomes (CLOs) and Assessment Plan						
	CLO / Activity	CLO 1	CLO2	CLO3	LAB CLO1	LAB CLO2	LAB CLO3
	Bloom Taxonomy Level	C2	C3	C3			
	Quiz 1	○					
	Quiz 2		○				
	Assignment 1	○					
	Assignment 2		○				
	MID TERM EXAM	○	○				
	Quiz 1		○				
	Quiz 2			○			
	Assignment 1		○				
	Assignment 2			○			
	FINAL TERM EXAM		○	○			
	Lab Final						

Lab Details
Mapping of CLOs to PLOs

PLO / CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	✓											
CLO2	✓											
CLO3		✓										
LAB CLO1												
LAB CLO2												
LAB CLO3												