

APPLIED PHYSICS (SEAP-113)

I. Course Details

Credit Hours	3 (2+1)
Pre-requisites	-
Course Leader	Dr. Naveed Ahmad
Recommended Textbook(s)	1. Fundamentals of Physics (Extended), 10th edition, Resnick and Walker
Recommended Reference (Books/Websites/Articles)	1. Electronic Devices (Conventional Current Version), 10 th Edition Thomas L. Floyd.

II. Course Learning Outcomes (CLO)

CLOs	Description	Domain	Taxonomy Level	PLOs	Assessment Artifact
CLO-1	<i>Apply</i> acquired knowledge to solve series and parallel resistor networks by using KVL and KCL	Cognitive	3	1	A1, Q1, Midterm, Final Term
CLO-2	<i>Describe</i> the basic operation and working of semiconductor devices	Cognitive	2	1	A2, Q2, Midterm, Final Term
CLO-3	<i>Apply</i> acquired knowledge to solve circuits which consists of semiconductor devices	Cognitive	3	1	A3, Q3, Final Term

III. Course Assessment

Evaluation Methods	Weight (%)
Quizzes	10
Assignments	10
Presentation/Project	5
Midterm	25
Final Term	50
Total	100

IV. Grading Policy

For students admitted in Fall 2021 and onwards

Grade	A+	A	B+	B	C+	C	D+	D	F
%age	>=90	80-89	75-79	70-74	65-69	60-64	55-59	50-54	<50
GPA	4.00	4.00	3.50-3.99	3.00-3.49	2.50-2.99	2.00-2.49	1.50-1.99	1.00-1.49	0.00

For students admitted before Fall 2021

Grade	A1	A2	A3	B1	B2	B3	C1	C2	D	F
%age	≥ 90	80-89	77-79	74-76	70-73	67-69	64-66	60-63	50-59	< 50
GPA	4.00	4.00	3.66	3.33	3.00	2.66	2.33	2.00	1.50	0.00

V. Course Contents

Charge, Negative and Positive charge, and Electric field, Basic concept of Voltage, Current and Resistor, Series and Parallel combinations of Resistors, Ohm's Law, KCL and KVL, Introduction of materials, conductor insulator semiconductor, electronic configuration, P type and n type materials, doping process, Introduction to diode theory, Approximations of diodes in circuits, some mathematical problems, Voltage and current relationship in diode, forward and reverse biasing of diodes, Zener diode and its applications, Rectifiers, Introduction to rectifiers, Half wave and full wave rectifier, Power supplies, Ripple factor and its calculations, Introduction of BJT and its operation, Collector characteristics of BJTs and region of operations, Continuation with BJT operation, Biasing of BJT, Common emitter configuration of BJT and concept of load line and Q point, Continuation with load line and Q point with some problems, Emitter bias configuration and stability of Q point, Voltage divider bias configuration and its analysis, Introduction of JFETs and MOSFETs, Basic theory of JFETs and MOSFETs, Basic calculations of JFETs and MOSFETs

VI. Weekly Breakdown

Week No.	CLO	Topics	Reference
1	CLO-1	Charge, Negative and Positive charge, and Electric field, Basic concept of Voltage	Chapter 1
2		Current and Resistor, Series and Parallel combinations of Resistors	Chapter 1
3		Ohm's Law, KCL and KVL	Chapter 2
4	CLO-1	Introduction of materials, conductor insulator semiconductor	Chapter 2
5		electronic configuration, P type and n type materials	Chapter 2
6		doping process, Introduction to diode theory, Approximations of diodes in circuits, some mathematical problems	Chapter 2
7		Voltage and current relationship in diode, forward and reverse biasing of diodes, Zener diode and its applications	Chapter 2
8	CLO-2	Rectifiers, Introduction to rectifiers, Half wave and full wave rectifier, Power supplies, Ripple factor and its calculations	Chapter 2

9	Mid Term Exams		
10	CLO-2	Introduction of BJT and its operation, Collector characteristics of BJTs and region of operations, Continuation with BJT operation. Biasing of BJT, Common emitter configuration of BJT and concept of load line and q point	Chapter 3
11		Continuation with load line and Q point with some problems, Emitter bias configuration and stability of Q point	Chapter 3
12	CLO-3	Emitter bias configuration and stability of Q point	Chapter 4
13		Voltage divider bias configuration and its analysis	Chapter 5
14		Introduction of JFETs and MOSFETs	Chapter 6
15		Basic theory of JFETs and MOSFETs	Chapter 6
16		Basic calculations of JFETs and MOSFETs	Chapter 6

APPLIED PHYSICS (SEAP-113) – LAB

I. Course Details

Credit Hours	3 (2+1)
Pre-requisites	-
Course Leader	Dr. Naveed Ahmad
Recommended Textbook(s)	2. Fundamentals of Physics (Extended), 10th edition, Resnick and Walker
Recommended Reference (Books/Websites/Articles)	2. Electronic Devices (Conventional Current Version), 10 th Edition Thomas L. Floyd

II. Lab Learning Outcomes (CLO)

CLOs	Description	Domain	Taxonomy Level	PLOs	Assessment Artifact
CLO-1	Explain the basic laws of electronic circuits and semiconductor devices using the appropriate methods.	Cognitive	2	1	Experiment Preform using Electronic Equipment, Report writing, Lab task, Midterm, Final term assessment
CLO-2	Practice fundamental circuit laws/principles and various applications of diodes and transistor to verify the behavior of electronic circuits.	Psychomotor	3	1	Experiment Preform using Electronic Equipment, Report writing, Lab task, Midterm, Final term assessment
CLO-3	Contribute individually or as a team member to work effectively.	Affective	2	6	Experiment Preform using Electronic Equipment, Report writing, Lab task, Midterm, Final term assessment

III. Lab Assessment

Evaluation Methods	Weight (%)
Internal Evaluation / Lab Report	60
Project / Open ended Lab	15
Final Term Exam	25
Total	100

IV. Weekly Breakdown (All CLOs shall be assessed in every lab)

Week No.	Topics
1	Introduction to Lab Equipment & Components
2	Error Analysis and Graph Drawing
3	To find resistance by colour coding and using digital multi meter
4	Series and Parallel Resistance Networks
5	Verification of Ohm's Law
6	Kirchhoff's Laws for DC circuits: Kirchhoff's Voltage Law (KVL)
7	Kirchhoff's Laws for DC circuits: Kirchhoff's Current Law (KCL)
8	Voltage Divider Rule and Current Divider Theorems
9	Midterm Exam
10	Charging and Dis-charging of capacitor
11	Study of Diode Characteristics curve
12	To study and implement Half-wave and Full-wave Rectifier
13	To observe Electrical Characteristics of Zener Diode and practice its use as Voltage Regulator
14	To study and observe the output characteristics of Bipolar Junction Transistor (BJT)
15	To study and perform the biasing BJT, Fixed Biasing, Voltage Divider and Collector Feedback Scheme
16	Final Lab Assessment.