University of Global Village (UGV), Barishal

Sessional and Lab module

Departmental Name: Electrical and Electronics Engineering

Subject Name:	Electronics Circuit Design	Total Class: 17		
	(2 nd Semester)	Total Class Hour: 35 hours		
Subject Code:		Total Practice Hour: 50 hours		
Directed by:	Abdul Hai Siddique & Apurbo Saikat Roy	Total: 85 hours		

Rationale of the Course:

This Course is very essential for learning and familiarizing the basics of electronic circuit components as well as the analysis of electronic circuits practically. This course will give the students' knowledge about design and implementation of any electronics circuit. And they will be able to compare the theoretical and practical values of electronic devices.

Course Objectives:

This course has been projected for the students

- To know about the design and implementation of any electronics circuit.
- To compare the theoretical and practical values of electronic devices.

Course learning outcomes (CLO): After successful completion of the course students will be able to -

CLO1	Match basic experimental experiences in physical operation and circuit applications of electronic devices with the theoretical knowledge.
CLO2	Investigate the working principle of different electronic components.
CLO3	Design different electronic projects and apply the knowledge in societal and environmental issues.

Week	Experiment Name	Topics Covered	Learning Outcome
Week 1-2	Introduction to Lab Equipment	Multimeter, Oscilloscope, Function Generator, Breadboard, Power Supply	Understand and operate basic lab equipment; Measure voltage, current, resistance, and waveform signals.
Week	Exploring V-I Characteristics of a Semiconductor Diode	Diode forward and reverse biasing, Knee	Analyze the V-I characteristics of a diode;
2-3		voltage, Reverse breakdown	Understand forward and reverse bias behavior.
Week 3-4	Design and Analysis of a Half-Wave Rectifier Circuit	Half-wave rectifier design, Ripple factor, Efficiency	Design and test a half-wave rectifier circuit; Measure and analyze output waveforms and ripple factor.
Week	Implementation of a Center-Tapped	Full-wave rectification using a center-	Design and analyze the center-tapped full-wave rectifier; Compare performance with half-wave rectifiers.
5-6	Full-Wave Rectifier Circuit	tapped transformer, Ripple reduction	
Week	Construction and Testing of a Full-	Bridge rectifier design, Filtering	Understand the operation of a full-wave bridge rectifier; Evaluate ripple reduction with filters.
7-8	Wave Bridge Rectifier	techniques	
Week	Waveform Shaping Using Series	Positive and negative series clipper	Design and analyze series clipper circuits;
9-10	Clipper Circuits	circuits, Waveform shaping	Observe their effects on input signal waveforms.
Week	Signal Conditioning with Positive and	Clamping circuits, DC level shifting,	Design positive and negative clamper circuits;
11	Negative Clampers	Clamper design and testing	Observe DC level shifting in waveforms.

Week 12	DC Analysis of a BJT in Common Emitter Configuration	DC biasing techniques, Load line analysis, Operating point calculation	Perform DC analysis of a BJT common emitter circuit; Understand biasing and Q-point determination.
Week 13	BJT Common Emitter Configuration AC Analysis	AC small-signal analysis, Voltage gain, Input/output impedance	Analyze the AC behavior of a common emitter amplifier; Evaluate voltage gain and impedance effects.
Week 14	Investigating the V-I Characteristics of an N-Channel Enhancement MOSFET	MOSFET enhancement mode operation, Threshold voltage, Transfer characteristics	Analyze the V-I characteristics of an N-channel MOSFET; Understand its switching behavior.

Table 2: Weekly Breakdown of Lab Exercises

Wee	Name of	Clas	Practi	Learning	Assessment	Expected Outcome	Content
k No.	Experiment	S	ce	Strategy	Strategy		
		Tim	Time				
		e	(mins)				
		(mm)					
1-2	V-I	120	180	Instructor-led	Lab report.	Understand the I-V	https://drive.google.com/driv
	Characteristi cs of Diode	120	100	demonstration , hands-on	viva	characteristics of diodes	e/folders/10Nsmc9uO2lotR2 ijSRYtrs0a0jUVY3He
	Experiment			practice			
2-3	Half-Wave Rectifier Circuit Experiment	120	180	Guided circuit assembly, troubleshooti ng practice	Lab performance , quiz	Analyze and construct a half- wave rectifier circuit	https://drive.google.com/driv e/folders/10Nsmc9u02lotR2 ijSRYtrs0a0jUVY3He
3-4	Center- Tapped Full- Wave Rectifier Circuit Experiment	120	180	Interactive lecture, circuit analysis and testing	Lab report, design evaluation	Compare performance of full- wave vs. half-wave rectifiers	https://drive.google.com/driv e/folders/10Nsmc9u02lotR2 ijSRYtrs0a0jUVY3He
5-6	Full-Wave Bridge Rectifier Circuit Experiment	120	180	Group work for circuit assembly, operational validation	Hands-on evaluation, presentation	Construct and analyze a bridge rectifier	https://drive.google.com/driv e/folders/10Nsmc9uO2lotR2 ijSRYtrs0a0jUVY3He
7-8	Series Clipper Circuit Experiment	120	180	Problem- solving exercises,	Quiz, lab performance assessment	Design and analyze clipper circuits	https://drive.google.com/driv e/folders/10Nsmc9u02lotR2 ijSRYtrs0a0jUVY3He

				real-time circuit testing			
9-10	Positive Clamper & Negative Clamper Circuit Experiment	120	180	Case studies, hands-on practice	Lab test, viva	Implement and evaluate clamping circuits	https://drive.google.com/driv e/folders/1ONsmc9uO2lotR2 ijSRYtrs0a0jUVY3He
11- 12	BJT Common Emitter Configuratio n DC Analysis Experiment	120	180	Hands-on practice, collaborative debugging	Circuit analysis report, practical demonstrati on	Analyze BJT configurations for amplification	https://drive.google.com/driv e/folders/1ONsmc9uO2lotR2 ijSRYtrs0a0jUVY3He
13- 14	V-I Characteristi cs of an N- Channel Enhancemen t MOSFET	120	180				https://drive.google.com/drive/fold ers/10Nsmc9uO2lotR2ijSRYtrs0a 0jUVY3He
15	Review Class	-	-	-			-
16	Practice Class	-	-	-			https://www.youtube. com/@sajalsomodder roni3656
17	Lab Test + Lab Quiz	-	-	-			

Course Reference Summary:

- 1. PDF & Books: <u>https://drive.google.com/drive/folders/10Nsmc9uO2lotR2ijSRYtrs0a0jUVY3He</u>
- 2. Video Content: https://www.youtube.com/@sajalsomodderroni3656 -

- Created By: Sajal Somodder Roni (Lab Instructor, EEE, UGV)

Assessment Pattern:

Continuous Assessment

Semester End Examination: (SEE):

Bloom's Category	Tests	Bloom's Category	Tests (20)	Quiz (10)	External Participation in Curricular/Co- Curricular Activities (20)
Imitation	12	Marks (out of 30)			
Manipulation	8	Imitation	06	06	Bloom's Affective — Domain: (Attitude or will)
Precision	6	Manipulation	04	04	• Attendance: 10
Articulation	2	Precision	06		• Viva-Voca: 5
Naturalization	2	Articulation	02		Report Submission:
		Naturalization	02		5