

No	Course Information (2019-2020)	
1	Unit name:	Analogue and Digital Electronics I
2	Code:	EcE – 31025
3	Classification:	Engineering Subject
4	Credit value:	2.5 (2-0-1)
5	Semester/ Year Offered:	1/3
6	Pre-requisite:	NA
7	Mode of delivery:	Lecture and Practical
8	Assessment system and breakdown of marks:	Exam, lab report, assignments and tutorial
	Practical	20%
	Tutorial / Assignment	10%
	Mid-Term Examination	70%
	Academic staff teaching unit:	Department of Electronic Engineering
	<p>Course outcome of unit:</p> <p>After completion of this course, students will be able to</p> <ul style="list-style-type: none"> • describe the basic structure, parameters, characteristics and operations of analog components (diode, transistor, operational amplifier) • calculate the parameters of basic electronic circuits (rectifier circuit, transistor switching circuits and transistor biasing circuits) • measure the characteristics of basic electronic component (diodes, transistor) and demonstrate the basic electronic circuits (rectifier circuit, switching circuit, op amp circuit) 	
9	<p>Synopsis of unit:</p> <p>The analog circuit will teach the fundamentals of diode application, BJTs and FET analog circuit design techniques used in today's advanced mixed-signal integrated-circuit applications. Topics to be covered include device/process background, IC passives, analog amplifiers, op-amp design, two thermal devices and other analog circuitry used in today's mixed-signal ICs. The digital circuit will teach the fundamentals of number systems and arithmetic, combinational logic, adder, 555 timer, counter and shift registers systems, frequency response, timing analysis, sequential digital circuit.</p>	

10	Topic:
1	Diodes 1.1 Introduction to PN Junction 1.2 Forward and Reverse Bias of a Diode 1.3 The Diode Characteristics 1.4 Important Diode Parameters 1.5 Diode Testing 1.6 Load- line Analysis
2	Diode Application 2.1 Diode Equivalent Circuits 2.2 Series Diode Configurations with DC Inputs 2.3 Parallel and Parallel-Series Configuration 2.4 Half-Wave and Full-Wave Rectifiers 2.5 Clippers 2.6 Clamper
3	Bipolar Junctions Transistor(BJT) 3.1 Basic BJT structures 3.2 BJT symbols, current and voltage 3.3 Basic BJT configuration 3.4 Region of Operation 3.5 Basic BJT equation 3.6 Important BJT parameter 3.7 BJT packages and terminal identification 3.8 BJT Testing
4	DC Biasing -BJT 4.1 Operating Point 4.2 Fixed-bias circuit 4.3 Emitter-stabilized circuit 4.4 Voltage divider bias circuit 4.5 DC bias with voltage feedback 4.6 Miscellaneous Bias Configurations 4.7 Biasing circuit design 4.7 Transistor switch network

	<p>4.8 Troubleshooting techniques</p> <p>4.9 Analysis of PNP circuits</p> <p>5 Field- Effect Transistors (FET)</p> <p>5.1 Basic FET structures and symbols</p> <p>5.2 FET Configurations and V-I Characteristics</p> <p>5.3 Basic FET Equations</p> <p>5.4 Important FET Parameters</p> <p>5.5 Comparison between BJT and FET</p> <p>6 FET – Biasing</p> <p>6.1 Fixed-bias Configuration</p> <p>6.2 Self-bias Configuration</p> <p>6.3 Voltage-Divider Biasing</p> <p>6.4 Biasing the Depletion type MOSFET</p> <p>6.5 Biasing the Enhancement-type MOSFET</p> <p>6.6 Review Table of FET Biasing</p> <p>6.7 Biasing Circuit Design</p> <p>7 Operational Amplifier</p> <p>7.1 Operational Amplifier Basic</p> <p>7.2 The Ideal Operational Amplifier</p> <p>7.3 Common Operational Amplifier Circuits</p> <p>8 Two Terminal Devices</p> <p>8.1 Zener Diode</p> <p>8.2 Photodiodes</p> <p>8.3 Photoconductive Cell</p> <p>8.4 Emitters</p> <p>8.5 Solar cells</p> <p>8.6 Thermistors</p>
11	<p>Main references:</p> <p>Electronic Devices and circuits Third Edition JIMMIE J CATHEY at Laboratory, Electronic Devices Fourth Edition Thomas L Floyd Digital fundamentals 10th Edition Thomas L.Floyd.</p>
12	<p>Additional references:</p>

Information on Lab Practical

Lab	Activity
1	<p>Topic: Testing Diode</p> <p>Task:</p> <ul style="list-style-type: none"> • To apply diode and classify forward bias and reverse bias • To discuss voltage and current of diode <p>Resources: Diode, Multimeter, project board, resistor, LED, power supply</p>
2	<p>Topic: Half-wave Rectifier</p> <p>Task:</p> <ul style="list-style-type: none"> • To define about half-wave rectifier • To describe the output waveform of half-wave rectifier <p>Resources: diode , 220V transformer, oscilloscope</p>
3	<p>Topic: Testing NPN BJT and PNP BJT</p> <p>Task:</p> <ul style="list-style-type: none"> • To classify NPN and PNP transistor • To classify base, collector, emitter <p>Resources: transistor , Multimeter</p>
4	<p>Topic : Transistor as a switch</p> <p>Task :</p> <ul style="list-style-type: none"> • To define a transistor can work as a switch • To apply transistor in other circuit <p>Resources : Resistor, transistor, LED, power supply, project board</p>
5	<p>Topic : Adder</p> <p>Task :</p> <ul style="list-style-type: none"> • To discuss the operation principle of adder • To apply the Op-amp and resistor <p>Resources : Resistor, Op-amp, power supply, project board</p>

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