

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT
COURSE CURRICULUM

Course Title: Applied Electronics and Instrumentation
(Code:3346304)

Diploma Programmes in which this course is offered	Semester in which offered
Agriculture Engineering	4 th Semester

1. RATIONALE

Nowadays all the modern component is controlled by power electronics devices. The function of electronics is to process and control the electric power by Supplying voltage and current. With the Advancement of power electronics devices the conventional control. Replaced by electronic control, employing solid state power semiconductor devices. This course is therefore designed so that the diploma engineers will be able to use power Electronics for controlling various applications. Essential theoretical and Practical knowledge to use electronics to control and Industrial sector will be achieved by this course.

2. COMPETENCY

The course content should be taught and implemented with the aim to develop required skills So that students are able to acquire following competency:

- Use electronics for controlling Power in various applications.

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
L	T	P		Theory Marks		Practical Marks		
			C	ESE	PA	ESE	PA	
3	0	2	5	70	30	20	30	150

Legends: L-Lecture; T – Tutorial/Teacher Guided Theory Practice; P - Practical; C – Credit; ESE - End Semester Examination; PA - Progressive Assessment.

4. DETAILED COURSE CONTENTS:

Unit	Major Learning Outcomes	Topics and Sub-topics
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<p style="text-align: center;">Unit – I Semiconductor Devices</p>	<p>1a. Introduction 1b. Describe Semiconductors, P-N junction, Draw V-I characteristics 1c. Explain Diode and rectifier 1d. Define Clipper</p>	<p>1.1. Semiconductors, P-N junction, V-I characteristics of P-N junction 1.2. Diode as a circuit element, rectifier 1.3. Clipper, clamper 1.4. Voltage multiplier, Capacitive filter. 1.5 Diode circuits for OR & AND gate</p>
<p style="text-align: center;">Unit – II Transistor and amplifier</p>	<p>2a. Explain Bipolar junction 2b. Define Amplifier 2c. Explain h-parameter 2d. Explain phase shift oscillator</p>	<p>2.1. Bipolar junction Transistor; operating point. 2.2. Classification of amplifier, various biasing methods 2.3.h-parameter model of a transistor, analysis of small signal. 2.4.CE amplifier, phase shift oscillator 2.5.Analysis of different amplifier using transistor</p>
<p style="text-align: center;">Unit– III OP-AMP</p>	<p>3a. Draw Ideal OP-AMP characteristics 3b. Deferent Linear and Non-linear application of AMP 3c. Explain Current limiting, OP-AMP Voltage regulator</p>	<p>3.1. Ideal OP-AMP characteristics. 3.2. Linear and Non-linear application of AMP. 3.3. Zener diode Voltage Regulator, transistor series regulator. 3.4Current limiting, OP-AMP Voltage regulator.</p>
<p style="text-align: center;">Unit– IV DIGITAL AND ANALOG</p>	<p>4a. Define Boolean algebra 4b. Explain Binary ladder D/A converter</p>	<p>4.1. Basic theorem of Boolean algebra. 4.2. Combinational logic circuits. 4.3. Binary ladder D/A converter. 4.4. Successive approximation A/D converter.</p>
<p style="text-align: center;">Unit– V Instrumentation system</p>	<p>5a. Define Velocity, force and pressure measurement using potentiometer. 5b. Define Burden tube, LVDT 5c. Define Strain gauge and tacho generator</p>	<p>5.1. Generalized instrumentation, measurement of displacement, temperature using potentiometer. 5.2 Velocity, force and pressure measurement using potentiometer. 5.3 Resistance thermometer, thermocouple. 5.4 Burden tube, LVDT 5.5 Strain gauge and tacho generator</p>

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks				Total
			R	U	A		
			Level	Level	Level		
1.	Semiconductor Devices	08	3	4	0		15
2.	Transistor and amplifier	08	5	5	4		15
3.	OP-AMP	09	3	5	4		10
4.	Digital and Analog	09	3	5	4		15
5.	Instrumentation system	08	2	3	7		15
	Total	42	20	29	21		70
Legends:							

R = Remembrance; U = Understanding; A = Application and above levels (Revised Bloom's taxonomy)

6. SUGGESTED LIST OF EXPERIMENTS

The experiments should be properly designed and implemented with an attempt to develop different types of skills leading to the achievement of the above mentioned expected competency.

Sr No.	Unit No.	List of Experiments	Teaching Hours
1	I.	To study V-I characteristics of PN junction diode	2
2	II.	To study Half wave Rectifier.	2
3	III.	To study full wave and Bridge Rectifier	2
4	IV.	To study transistor characteristics in CE configurations.	2
5	V.	To design study fixed and self-bias transistor.	2
6	VI.	To design study potential divider bias transistor.	2
7	VII.	To study a Diode as clipper and clamper.	2
8	VIII.	To study a OP-AMP IC 741 as inverting and non-inverting amplifier	2
9	IX.	To study a OP-AMP IC 741 as differentiator amplifier	2
10	X.	Test Zener diode as voltage regulator	2

7. SUGGESTED LIST OF PROPOSED STUDENT ACTIVITIES

Following is the list of proposed student activities like:

- i. Prepare journals based on practical.
- ii. Prepare a report on various types of Electronic instrumentation used in nearby industries.
- iii. Assignments on solving Question

- iv. Prepare chart displaying various Power semiconductor devices and instrumentation and their symbols
 v. Make a market survey for various types of Amplifier available in market.

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

- i. Visit nearby industries to see the industrial applications of Power Semiconductor devices, op-amp and circuits.

10. SUGGESTED LEARNING RESOURCES

A. List of Books

S.No.	Author	Title of Books	Publication/Year
1	Albert Paul Malvino,	Electronic Principles	TMH
2	Vincent Del Toro,	Electrical Engineering Fundamentals	PHI
3	A.K Sawhney, Dhanpat Rai.	A course in electrical and electronic measurements & instrumentation	Khanna Publishers, New Delhi.
4	Boylestad, PHI.	Electronic Devices & Circuit Theory	Tata McGraw-hill Publishing Co. Ltd., New Delhi.
5	Allen Mottershead, PHI.	Electronic Devices & Circuits	Oxford & IBH Publication Co.

B. List of Major Equipment/ Instrument

- i. Digital meter
- ii. Transistor
- iii. LVDT
- iv. Rectifier

C. List of Software/Learning Websites:

- i. <https://en.wikipedia.org/wiki/Linear>
- ii. https://en.wikipedia.org/wiki/Operational_amplifier
- iii. <https://en.wikipedia.org/wiki/rectifier>
- iv. <https://en.wikipedia.org/wiki/transistor>
- v. <https://en.wikipedia.org/wiki/Semiconductor>