

NIRMA UNIVERSITY

Institute:	Institute of Technology
Name of Programme:	B. Tech.in Electronics and Instrumentation engineering
Semester:	IV
Course Code:	2EI602
Course Title:	Applied Electronics
Course Type:	Core
Year of Introduction:	2023-24

L	T	Practical component				C
		LPW	PW	W	S	
2	0	2	-	-	-	3

Course Learning Outcomes (CLOs):

At the end of the course, students will be able to –

1. explain the operation of various power electronic devices. (BL2)
2. analyse various electronics circuitry. (BL3)
3. design various electronics circuits. (BL4)
4. build/ simulate the electronic circuits. (BL5)

Teaching Hours: 30

Unit	Syllabus	Teaching hours
Unit- I	Introduction to the Applied electronics Introduction to components and devices used in electronic industries .characteristics of the devices	02
Unit- II	Thyristors & Power Electronics Devices Silicon controlled rectifier, SCR terminology and two transistor model, Static and dynamic characteristics of SCR, Turn-on methods of a Thyristor, Different triggering circuits for SCRs, Turn-off methods of Thyristor, Different methods of forced commutation, Thyristor ratings, Power transistor, Power MOSFET, IGBT, MCT, Comparison between Power transistor, Power MOSFET and Power IGBT.	11
Unit- III	Circuit Design for the DC, BLDC and Stepper motor driver Classification of controlled converters, Single phase half wave-controlled rectifier, Single phase full wave-controlled rectifier, Single phase half-controlled bridge rectifier, Symmetrical and asymmetrical configurations, Single phase full controlled bridge rectifier, three phase-controlled converters – Half wave converter, semi-converter and full converter. Concept of sensor less controller for the BLDC motor, Stepper motor drivers	11
Unit- IV	Applications of electronic devices Application of power electronic devices in household appliances like UPS, switch breaker , mixer grinder, fan etc. Case studies related to the power distribution , solar power devices and solar power processing ,electrical vehicles, celling fan, drone.	06

Laboratory Work:

This shall consist of at least 10 practicals based on the above syllabus.

Suggested Reading:

1. M. D. Singh and K. B. Khanchandani, Power Electronics, Tata-McGraw Hill
2. P. S. Bimbhra, Power Electronics, Khanna Publication.
3. Sand Hoon Kim, Electrical Motor Control : DC, AC and BLDC, Elsevier Publication
4. B. Paul, Industrial Electronics and Control Publication., PHI

**Suggested List of Experiments (not restricted to the following):
(Only for Information)**

	Title of Experiment	Hrs.
1.	To observe the characteristics of SCR.	2
2.	To observe the firing of SCR using Resistance Triggering Circuit.	2
3.	To observe the firing of SCR Using RC Triggering Circuit	2
4.	To observe the characteristics of IGBT.	2
5.	To observe the characteristics of TRIAC and to justify that TRIAC can be considered as anti-parallel combination of two SCRs.	2
6.	To design and develop a Lamp dimmer control circuit.	2
7.	To design and develop a relaxation oscillator circuit using UJT	2
8.	To observe the performance of SCR firing using UJT trigger circuit with resistance controlled pedestal and linear ramp	2
9.	To demonstrate the working of SCR based half-wave controlled rectifier	2
10.	To demonstrate the working of SCR half-controller bridge converter with reactive Load and freewheeling diode.	2
11.	To design the Electronics Speed Controller for the given application	4
12.	To design the battery charging unit for the given application.	4

L = Lecture, T = Tutorial, P = Practical, C = Credit

w.e.f. the academic year 2023 - 24 and onwards

