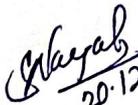


ACADEMIC SESSION: 2025-26

Discipline: <i>Electrical Engineering</i>	Semester: 4th	Name of the Teaching Faculty: <i>Sri Shallesh Kumar Nayak</i> <i>Lecturer Stage-II(ETC)</i>
Subject: Fundamentals of Power Electronics	No. of days / week class allotted	Semester wef: 22/12/2025 to 18/1/042026 Nos. of Weeks per semester: 15
Week	Class Day	Theory Topics
1 ST	1 st	Power Electronic Devices Power electronic devices
	2 nd	Power transistor Construction and working principle
	3 rd	Power transistor V-I characteristics and uses
2 ND	1 st	IGBT Construction and working principle
	2 nd	IGBT V-I characteristics and uses
	3 rd	Concept of Single Electron Transistor (SET)
3 RD	1 st	Aspects of Nano- technology(concept only)
	2 nd	Thyristor Family Devices 2.1 SCR
	3 rd	Construction of SCR
4 TH	1 st	Two transistor analogy of SCR
	2 nd	Types, working and characteristics
	3 rd	SCR mounting and cooling
5 TH	1 st	Types of Thyristors: Thyristor family devices Symbol and construction, Operating principle and V-I characteristics of SCR, LASCR, SCS,
	2 nd	Symbol and construction, Operating principle and V-I characteristics of GTO, UJT,
	3 rd	Symbol and construction, Operating principle and V-I characteristics of PUT, DIAC
6 TH	1 st	Symbol and construction, Operating principle and V-I characteristics of TRIAC
	2 nd	Protection circuits Over-voltage, Over-current
	3 rd	Snubber
7 TH	1 st	Crowbar
	2 nd	Revision
	3 rd	Turn-on and Turn-off Methods of Thyristors SCR Turn-On methods High Voltage thermal triggering,

8 TH	1 st	Illumination triggering
	2 nd	dv/dt triggering. Gate triggering, Gate trigger circuits
	3 rd	Resistance and Resistance-Capacitance circuits
9 TH	1 st	SCR triggering using UJT
	2 nd	PUT: Relaxation Oscillator and Synchronized UJT circuit
	3 rd	Pulse transformer and opto-coupler based triggering
10 TH	1 st	SCR Turn-Off methods: Class A- Series resonant commutation circuit Class B-Shunt Resonant commutation circuit
	2 nd	Class C-Complimentary Symmetry commutation circuit Class D-Auxiliary commutation
	3 rd	Class E-External pulse commutation Class F-Line or natural commutation
11 TH	1 st	Revision
	1 st	Phase Controlled Rectifiers Phase control: firing angle, conduction angle.
	2 nd	Single phase half controlled, full controlled and midpoint controlled rectifier with R, RL load
12 th	3 rd	Single phase half controlled, full controlled and midpoint controlled rectifier with R, RL load
	1 st	Circuit diagram, working, input- output waveforms, equations for DC output and effect of freewheeling diode
	2 nd	Circuit diagram, working, input- output waveforms, equations for DC output and effect of freewheeling diode
13 th	3 rd	Different configurations of bridge controlled rectifiers: Full bridge, half bridge with common anode, common cathode, SCRs in one arm and diodes in another arm
	1 st	Different configurations of bridge controlled rectifiers: Full bridge, half bridge with common anode, common cathode, SCRs in one arm and diodes in another arm
	2 nd	Revision
14 th	3 rd	Industrial Control Circuits Applications: Burglar's alarm system,
	1 st	Battery charger using SCR, Emergency light system,
	2 nd	Temperature controller using SCR and Illumination control/fan speed control TRIAC
15 th	3 rd	SMPS
	1 st	UPS: Offline and Online
	2 nd	SCR based AC and DC circuit breakers.
	3 rd	Revision


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