

"PVC" NSSK Govt. Polytechnic Bilaspur at Kalol
Lecture Planning (Theory)

Branch : **Electrical Engg.**
 Subject : **Fundamentals of Power Electronics**
 Teacher : **Vivek Kumar**

Semester: **4th**
 Session: **Jan-May, 25**
 Cass Room : **L4**

Sr. No.	No. of Lectures	Chapter/ Unit Description	Detail of Contents	Reference Resources	Remarks
1.	1-8	Power Electronic Devices	Power electronic devices Power transistor: construction, working principle, V-I characteristics and uses. IGBT: Construction, working principle, V-I characteristics and uses. Concept of single electron transistor (SET) - aspects of Nano-technology.	R1,R2, R3,R4,R5	
2.	9-20	Thyristor Family Devices	SCR: construction, two transistor analogy, types, working and characteristics. SCR mounting and cooling. Types of Thyristors: SCR, LASCR, SCS, GTO, UJT, PUT, DIAC and TRIAC Thyristor family devices: symbol, construction, operating principle and V-I characteristics. Protection circuits: over-voltage, over-current, Snubber, Crowbar.	-do-	
3.	21-34	Turn-on and Turn-off Methods of Thyristors	SCR Turn-On methods: High Voltage thermal triggering, Illumination triggering, dv/dt triggering, Gate triggering. Gate trigger circuits - Resistance and Resistance-Capacitance circuits. SCR triggering using UJT, PUT: Relaxation Oscillator and Synchronized UJT circuit. Pulse transformer and optocoupler based triggering. SCR Turn-Off methods: Class A- Series resonant commutation circuit, Class B-Shunt Resonant commutation circuit, Class C- Complimentary Symmetry commutation circuit, Class D -Auxiliary commutation, Class E External pulse commutation, Class F- Line or natural commutation.	-do-	
4.	35-47	Phase Controlled Rectifiers	Phase control: firing angle, conduction angle. Single phase half controlled, full controlled and midpoint controlled rectifier with R, RL load: Circuit diagram, working, input- output waveforms, equations for DC output and effect of freewheeling diode. Different configurations of bridge controlled rectifiers: Full bridge, half bridge with common anode, common cathode, SCRs in one arm and diodes in another arm.	-do-	
5.	48-56	Industrial Control Circuits	Applications: Burglar's alarm system, Battery charger using SCR, Emergency light system, Temperature controller using SCR and Illumination control / fan speed control TRIAC, SMPS. UPS: Offline and Online SCR based AC and DC circuit breakers.	-do-	

Signature of Teacher with Date


 - 28/1/25

Signature of HOD (EE)

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"PVC" NSSK Govt. Polytechnic Bilaspur at Kalol
Practical Planning & Coverage

Branch : **Electrical Engg.**
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 Teacher : **Vivek Kumar**

Semester: **4th**
 Session: **Jan 25 - May 25**
 Lab Name : **Electronics Lab**

Practical No.	Description of Practical	Reference for Procedure/ Writeup	Likely Dates	Actual Dates	Sign
1	Test the proper functioning of DIAC to determine the break over voltage.	Lab Manual			
2.	Determine the latching current and holding current using V-I characteristics of SCR.	Lab Manual			
3.	Test the variation of R, C in R and RC triggering circuits on firing angle of SCR.	Lab Manual			
4.	Test the effect of variation of R, C in UJT triggering technique.	Lab Manual			
5	Perform the operation of Class - A, B, C, turn off circuits.	Lab Manual			
6	Perform the operation of Class -D, E, F turn off circuits.	Lab Manual			
7	Use CRO to observe the output waveform of half wave controlled rectifier with resistive load and determine the load voltage.	Lab Manual			
8	Draw the output waveform of Full wave controlled rectifier with R load, RL load, freewheeling diode and determine the load voltage.	Lab Manual			
9	Determine the firing angle using DIAC and TRIAC phase controlled circuit on output power under different loads such as lamp, motor or heater.	Lab Manual			
10	Simulate above firing angle control on SCILAB software .	Lab Manual			
i1	Test the performance of given SMPS, UPS.	Lab Manual			
12	Troubleshoot the Burglar's alarm, Emergency light system, Speed control system, Temperature control system.	Lab Manual			

Signature of Teacher *With Date*

 25/1/25

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 Signature of HOD (EE)