

ANURAG Engineering College

(An Autonomous Institution)

II B.Tech II Semester Supplementary Examinations, December – 2024

POWER ELECTRONICS

(ELECTRICAL AND ELECTRONIC ENGINEERING)

Time: 3 Hours**Max. Marks: 75****Section – A (Short Answer type questions)****(25 Marks)****Answer All Questions**

	Course Outcome	B.T Level	Marks
1. Draw the static characteristics of an SCR.	CO1	L2	2M
2. Mention the advantages of power IGBTs over BJTs.	CO1	L2	3M
3. How does the presence of a freewheeling diode affect the performance of a half-controlled converter?	CO2	L2	2M
4. Derive the expression for the average load voltage of a half-controlled converter with a resistive load.	CO2	L2	3M
5. List the advantages of midpoint and bridge connections in three-phase converters.	CO3	L2	2M
6. How does a six-pulse converter improve the performance compared to a three-pulse converter?	CO3	L2	3M
7. Why is a firing circuit necessary in an AC voltage controller?	CO4	L2	2M
8. What are the applications of cyclo-converters?	CO4	L2	3M
9. Define Duty cycle.	CO5	L1	2M
10. A step up chopper is operated with a duty ratio of 0.6 for a dc input of 100 V. Determine the output voltage for a load resistance R_L of 5 ohm.	CO5	L2	3M

Section B (Essay Questions)**Answer all questions, each question carries equal marks.****(5 X 10M = 50M)**

11. A) Analyse the static and dynamic characteristics of SCRs with suitable graphical representations.	CO1	L3	10M
OR			
B) i) Compare the merits and demerits of IGBT and MOSFET.		L2	6M
ii) Explain the working of current commutation technique.	CO1	L3	4M
12. A) Explain the operation of a single-phase full bridge converter with RL load with a neat sketch and also derive the expression for average output voltage	CO2	L3	10M
OR			
B) Examine the single-phase half wave rectifier circuit with RL load and freewheeling diode.	CO2	L3	10M
13. A) Derive the expression for the average load voltage of a three-phase three-pulse converter with an R load.	CO3	L3	10M
OR			
B) Explain the principle of operation of single-phase dual converter with neat power circuit diagram.	CO3	L2	10M

14. A) Explain the operation of a single-phase AC voltage controller with two SCRs connected in anti-parallel, considering R a load. CO4 L3 10M
- OR**
- B) Describe the principle of operation of a single-phase midpoint cyclo-converter with resistive and inductive loads. CO4 L3 10M
15. A) Discuss the principle of operation of DC-DC step up chopper with suitable waveform. Derive an expression for its average DC output voltage CO5 L3 10M
- OR**
- B) Explain Voltage Source Inverter using 180° conduction mode with relevant waveforms CO5 L2 10M