

ANURAG Engineering College

(An Autonomous Institution)

III B.Tech I Semester Supplementary Examinations, Dec-2023/Jan-2024

POWER ELECTRONICS

(ELECTRICAL & ELECTRONICS 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. What are the necessary conditions for turning ON a SCR?	CO1	L2	2M
2. Define holding current.	CO1	L1	3M
3. What is reactive power input of single-phase full converter at $\alpha = 30^\circ$?	CO2	L2	2M
4. What are the drawbacks of source inductance on the performance of phase-controlled rectifiers?	CO2	L2	3M
5. Give the list of applications of three phase-controlled converters.	CO3	L1	2M
6. Write the expression for average RMS voltages of 3- Φ fully controlled converter with R load?	CO3	L2	3M
7. Draw the waveforms of single-phase ac voltage controller with R load with $\alpha = 60^\circ$.	CO4	L1	2M
8. Define Cyclo Converter?	CO4	L2	3M
9. List any two applications of choppers.	CO5	L2	2M
10. What are the various voltage control Techniques for 1- Φ Bridge Inverter?	CO5	L1	3M

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

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| 11. A) What are the types of switching characteristics of SCR? How do you know turn ON and turn OFF times from the switching characteristics? Explain. | CO1 | L3 | 10M |
| OR | | | |
| B) Describe the switching characteristics of power MOSFET and what are the requirements of gate drive to get less turn OFF and turn ON times? | CO1 | L3 | 10M |
| 12. A) Explain the operation of single-phase half-wave controlled rectifier having R-L load and freewheeling diode under discontinuous and continuous conduction modes with the help of wave forms. | CO2 | L3 | 10M |
| OR | | | |
| B) Explain the effect of source inductance on the performance of a single-phase full converter with the help of voltage waveforms. Derive an expression for its output voltage in terms of supply voltage, source inductance and load current. | CO2 | L3 | 10M |
| 13. A) Describe the operation of three phase full converter feeding an R load and draw the wave forms for any firing angle which is more than the 90° . | CO3 | L3 | 10M |

OR

- B) Explain the effect of source inductance on a 3- Φ full converter bridge by deriving expression for output voltage with overlap and also the voltage regulation due to source inductance. CO3 L3 10M
14. A) Describe the operation of single-phase full wave ac regulator feeding resistive load. Derive the expression for output voltage. CO4 L3 10M
- OR**
- B) For a 1- Φ midpoint cycloconverter, explain the operation of the circuit when fed to R-load with the help of neat circuit diagrams and relevant output waveforms for $\alpha=30^\circ$ and $\alpha=120^\circ$ for $f_o=1/4 f_s$. CO4 L3 10M
15. A) Explain the operation of boost converter in the CCM mode and obtain the expression for amplitude of ripple current. CO5 L3 10M
- OR**
- B) Discuss various PWM techniques used in inverters. How sinusoidal PWM is useful in the harmonic elimination? CO5 L3 10M