

C

Reg. No. :

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Question Paper Code: U5301

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2023

Fifth Semester

Electrical and Electronics Engineering

21UEE501 - POWER ELECTRONICS

(Regulations 2021)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5Marks)

1. The latching current is -----the holding current. CO1– U
(a) higher than (b) lower than (c) as same as (d) negative of
2. Firing angle is used ----- CO1-U
(a) to burn device any time of SCR (b) to control on-off timing of SCR
(c) to control off timing of general transistor (d) None of these
3. A chopper may be thought as a CO1-U
(a) Inverter with DC input (b) DC equivalent of an AC transformer
(c) Diode Rectifier (d) None of these
4. Single phase half bridge inverters requires CO1-U
(a) two wire ac supply (b) two wire dc supply
(c) three wire ac supply (d) three wire dc supply
5. In AC voltage controllers the CO1– U
(a) variable ac with fixed frequency is obtained
(b) variable ac with variable frequency is obtained
(c) variable dc with fixed frequency is obtained
(d) variable dc with variable frequency is obtained

PART – B (5 x 3= 15Marks)

- | | |
|--|---------|
| 6. Illustrate latching current of SCR | CO1 - U |
| 7. Define commutation angle or overlap angle | CO1-U |
| 8. Infer Duty cycle. | CO1-U |
| 9. Differentiate VSI and CSI | CO1-U |
| 10. Define Cycloconverter. | CO1-U |

PART – C (5 x 16= 80 Marks)

- | | | |
|---|---------|------|
| 11. (a) Explain the switching characteristics of Power IGBT with neat circuit diagram and waveform | CO1-U | (16) |
| Or | | |
| (b) Illustrate the switching characteristics of power MOSFET with neat circuit diagram and waveform | CO1-U | (16) |
| 12. (a) Derive an expression for the average output voltage of single phase full converter with RL load and sketch relevant waveform | CO4-Ana | (16) |
| Or | | |
| (b) Explain the operation of single phase half controlled converter with inductive load ,Also derive an expression for the average output voltage. | CO4-Ana | (16) |
| 13. (a) Draw the circuit of buck regulator and explain its working principle with necessary waveforms. Derive the expression for peak to peak ripple voltage of the capacitor that is present across the load | CO5-Ana | (16) |
| Or | | |
| (b) With neat power circuit diagram ,explain the operation of boost converter Draw the load voltage and load current waveforms and derive the expression for the output voltage . | CO5-Ana | (16) |
| 14. (a) Describe the principle of operation of 3 phase voltage source inverter with 120° conduction mode with necessary waveform. Derive the expression for line to line voltage. | CO1-U | (16) |
| Or | | |
| (b) Demonstrate the working of a single phase full bridge inverter with relevant circuit and waveform. | CO1-U | (16) |

15. (a) With the aid of circuit diagram and waveform explain the operation of power factor control and single phase full wave ac voltage controller. CO5-Ana (16)

Or

- (b) Describe the operation of single phase step down cycloconverter with center tapped transformer configuration and also explain the operation with output current and voltage waveforms CO5-Ana (16)

