



B.E DEGREE EXAMINATIONS: NOV/DEC 2022

(Regulation 2018)

Fifth Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

U18EET5001: POWER ELECTRONICS

COURSE OUTCOMES

- CO1:** Distinguish the operation, capabilities, characteristics of various power semiconductor devices and driver circuits.
- CO2:** Analyze the performance of AC-DC converter for different loads
- CO3:** Utilize the principle of DC-DC converters with various control techniques for renewable energy application.
- CO4:** Apply the Voltage and frequency control of inverters and AC-AC converters
- CO5:** Design a simulation model for power electronic converter

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

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|---|-----|-------------------|
| 1. What are the advantages of GTO over SCR? | CO1 | [K ₁] |
| 2. What are snubber circuits and why are they used in power circuit? | CO1 | [K ₂] |
| 3. What are the types of commutation? | CO2 | [K ₁] |
| 4. Define commutation angle or overlap angle? | CO2 | [K ₁] |
| 5. What are the disadvantages of variable frequency control in chopper? | CO3 | [K ₂] |
| 6. What is the role of Buck boost converter in solar PV system in simulation model? | CO5 | [K ₂] |
| 7. Mention the applications of a Current source inverter? | CO4 | [K ₂] |
| 8. Define Total harmonic distortion. | CO4 | [K ₂] |
| 9. Differentiate unidirectional and bi-directional ac voltage controllers. | CO4 | [K ₂] |
| 10. What is meant by step-up cyclo-converters? | CO4 | [K ₁] |

Answer any FIVE Questions:-

PART B (5 x 16 = 80 Marks)

(Answer not more than 400 words)

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|--|---|-----|-------------------|
| 11. a) Explain the different modes of operation of thyristor with the help of static VI characteristics. | 8 | CO1 | [K ₂] |
| b) Describe the switching characteristics of power MOSFET. | 8 | CO1 | [K ₂] |

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|-----|----|--|----|-----|-------------------|
| 12. | a) | Explain the operation of 1 Φ full converter with R load with circuit and wave form. | 8 | CO2 | [K ₂] |
| | b) | Describe the operation of single-phase dual converter with circulating and non-circulating current type with neat circuit. | 8 | CO2 | [K ₂] |
| 13. | a) | Describe the principle of step-up chopper with neat circuit and waveforms. Derive an expression for the average output voltage. | 10 | CO3 | [K ₃] |
| | b) | A step down dc chopper has input voltage of 230V with 10 ohm load, voltage drop across chopper is 2V when it is on. For a duty cycle of 0.5. Calculate i) average and rms value of output voltage ii) power delivered to the load. | 6 | CO3 | [K ₃] |
| 14. | | Explain the operation of 3 ϕ bridge inverter for 180 degree mode of operation with aid of relevant phase and line voltage waveforms. | 16 | CO4 | [K ₃] |
| 15. | a) | Explain the operation of 1 ϕ AC voltage controller with R load with neat circuit and waveform. | 8 | CO4 | [K ₂] |
| | b) | Describe the operation of single phase to single phase step down cycloconverter. | 8 | CO4 | [K ₂] |
| 16. | a) | Explain the Multiple PWM and sinusoidal PWM control of inverter. | 8 | CO4 | [K ₂] |
| | b) | Describe the working of four quadrant chopper with neat circuit. | 8 | CO3 | [K ₃] |
