

Roll No.

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Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (Electrical & Electronics) (2018 Batch) (Sem.-4)

POWER ELECTRONICS

Subject Code : BTEE-403-18

M.Code : 77608

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

1. What are advantages of use of thyristors compared to power MOSFET and IGBT in power circuits?
2. Discuss Turn On time of MOSFETs.
3. Enlist various thyristor phase control rectifiers and give their applications.
4. Define firing angle in a single-phase full wave-controlled converter.
5. Compare various control strategies used for obtaining variable output voltage from a dc chopper.
6. Discuss various methods employed turn on a SCR.
7. Elaborate applications of three phase inverters.
8. Draw diagram of single-phase voltage source inverters.
9. Enumerate different methods to control the inverter output voltage.
10. Give various applications of chopper circuits.

SECTION-B

11. Explain V–I transfer characteristics of IGBT with circuit diagram.
12. Explain thyristor switching characteristics.
13. Draw diagram of DC-DC boost converter and discuss its operation.
14. Explain with diagram operation of single-phase full-wave controlled converter and sketch waveforms.
15. A step-down chopper circuit is supplied with power from an ideal voltage source of terminal voltage 200 V. The load voltage waveform consists of rectangular pulses across a $1\text{ k}\Omega$ resistor of duration 1 ms in a cycle of 2.5 ms. Calculate the average value, rms value, ripple factor and output power of the circuit.

SECTION-C

16. What is the need of thyristor commutation? Explain with diagram class B: resonant pulse thyristor commutation technique with waveforms.
17. Describe a voltage commutated chopper with relevant current and voltage waveforms as a function of time. The chopper operation may be divided into certain well-defined modes. Enumerate the various simplifying assumption made. Show the effective on period for this chopper is load dependent. Find also the minimum permissible on-period in terms of commutating parameters.
18. Draw circuit diagram of single-phase bridge inverter. Explain its operation with input and output voltage waveforms.