

17638

11920

3 Hours / 100 Marks

Seat No.

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- Instructions* – (1) All Questions are *Compulsory*.
(2) Answer each next main Question on a new page.
(3) Illustrate your answers with neat sketches wherever necessary.
(4) Figures to the right indicate full marks.
(5) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. a) **Attempt any THREE of the following:** **12**
- (i) Explain operating principle of SCR using two transistor analogy.
 - (ii) Differentiate between 1ϕ and 3ϕ controlled converter on the Basis of no. of SCRs, current capacity, application and cost.
 - (iii) State the need of inverter. Give it's classification.
 - (iv) Give the operation of speed control of DC series motor with step down chopper with a neat diagram. Also draw it's waveform.
- b) **Attempt any ONE of the following:** **6**
- (i) Draw a neat circuit diagram of 1ϕ fully controlled bridge converter with RL load and give it's operation with waveform.
 - (ii) Draw circuit diagram of full bridge inverter. Draw waveform of load voltage and load current for RL load. Explain it's operation.

P.T.O.

2. Attempt any FOUR of the following: 16

- a) State different SCR triggering method. Explain dv/dt triggering method.
- b) Give the concept of firing angle and conduction angle with a neat waveform.
- c) Draw and explain working of single phase half controlled bridge inverter.
- d) Explain with waveforms the constant frequency system and variable frequency system for chopper control.
- e) Explain operation of speed control of 3ϕ induction motor with variable frequency square wave VSI method.
- f) Describe with neat sketch working of battery charger using SCR.

3. Attempt any FOUR of the following: 16

- a) Draw symbol and VI characteristics of following device:
 - (i) GTO
 - (ii) IGBT
 - (iii) LASCR
 - (iv) TRAIC
- b) Draw circuit diagram of single phase fully controlled half wave converter with RL load and free wheeling diode.
- c) Describe the operation of single phase series inverter. How the basic circuit performance can be improved?
- d) Explain with circuit diagram the application of SCR for static VAR compensation in power system.
- e) List the advantages of AC drives over DC drives (Any four points).

4. a) **Attempt any THREE of the following:** **12**
- (i) Draw a neat labelling VI characteristics of SCR and explain the region.
 - (ii) Explain the effect of source impedance on the performance of 1ϕ fully controlled converter.
 - (iii) Explain working of sinusoidal pulse width modulation.
 - (iv) Sketch circuit diagram of current commutated chopper. Explain its operation with waveforms.
- b) **Attempt any ONE of the following:** **6**
- (i) Give the operation of 3ϕ Fully controlled bridge converter with R load with a neat diagram. Also draw its waveform.
 - (ii) Draw a neat circuit diagram of class D chopper and give its operation with waveform.
5. **Attempt any FOUR of the following:** **16**
- a) Give any four specifications of SCR.
 - b) Explain auxiliary commutation with a neat diagram.
 - c) Give the operation of class C chopper with a neat diagram also draw the waveform.
 - d) Draw circuit diagram of basic parallel inverter and describe its operation.
 - e) Draw the circuit diagram of DC static circuit breaker and give its operation.
 - f) Give the principle of induction heating control with a neat representation.

6. Attempt any FOUR of the following:**16**

- a) List the factors required for selection of heat sink used for SCR.
 - b) Explain use of free wheeling diode in controlled converter.
 - c) List drawbacks of harmonics at the o/p of inverter. Explain filter method of harmonic reduction.
 - d) Describe the operation of Jone's chopper with circuit diagram.
 - e) Give the operation of automatic street lighting circuit using SCR with a neat diagram.
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