

17444

15116

3 Hours / 100 Marks

Seat No.

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- Instructions* – (1) All Questions are *Compulsory*.
(2) Illustrate your answers with neat sketches wherever necessary.
(3) Figures to the right indicate full marks.
(4) Assume suitable data, if necessary.
(5) Use of Non-programmable Electronic Pocket Calculator is permissible.
(6) Preferably write the answers in sequential order.

Marks

1. a) Attempt any SIX of the following :

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- (i) Draw the symbols of –
 - (1) SUS
 - (2) LASCR
- (ii) State any two uses of IGBT.
- (iii) Name any two triggering devices used triggering triac.
- (iv) Define inverter and state its any two applications.
- (v) State difference between forced commutation and natural commutation. (Any two points)
- (vi) Define choppers and classify it.
- (vii) Give classification of controlled rectifiers.
- (viii) State any two applications of UPS.

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b) **Attempt any TWO of the following :****8**

- (i) Compare half wave controlled rectifier and full wave controlled rectifier with respect to following parameters.
 - (1) Number of SCR's
 - (2) Average load voltage
 - (3) Ripple frequency
 - (4) Applications
- (ii) Compare between step-down and step-up chopper.
(Any four points)
- (iii) Draw the labelled circuit diagram of DC delay timer using SCR and UJT.

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

- a) Draw V-I characteristics of SCR and define –
 - (i) Holding current
 - (ii) Latching current
- b) Describe RC gate triggering method of SCR with neat circuit diagram and waveforms.
- c) Draw block diagram of SMPS and describe its working.
- d) Draw circuit diagram of step-down chopper and explain its working with neat waveforms.
- e) Draw the circuit diagram of single phase half bridge inverter. Explain its working with neat waveforms.
- f) Draw the circuit diagram and input and output voltage waveforms of 3-phase half wave rectifier with resistive load.

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

- a) Draw structure of a power MOSFET. State any two applications of it.
- b) Differentiate SCR and TRIAC with respect to –
 - (i) Symbol
 - (ii) Layered diagram
 - (iii) Operating quadrant
 - (iv) Application
- c) Draw two transistor analogy circuit of SCR. Write equation for I_D and describe its working.
- d) Draw single phase centre tapped controlled rectifier with RL load and its load voltage waveform.
- e) Draw the neat circuit diagram of single phase half wave controlled rectifier with resistive load and describe its working.
- f) A single phase full wave controlled rectifier is supplied with a voltage $V = 200 \sin(314t)$. Find average output DC voltage and current if firing angle is 30° and load resistance is 100Ω .

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

- a) Draw the neat circuit diagram of step-up chopper and draw its input and output voltage waveforms.
- b) Draw constructional diagram of GTO and state two differences between GTO and SCR.
- c) Draw fan speed regulator circuit using DIAC and TRIAC.
- d) Draw circuit diagram of class C commutation and explain its working.
- e) Draw circuit diagram of simple battery charger and explain its working.
- f) Define harmonic factor and total harmonic distortion with respect to inverters.

- 5. Attempt any FOUR of the following :** **16**
- a) Draw the neat circuit diagram of emergency lighting system using SCR and describe its working.
 - b) What is polyphase rectifier ? State its advantages.
 - c) Draw V-I characteristics of UJT and describe its different operating regions.
 - d) Draw the circuit of synchronised UJT gate triggering of SCR and explain its working.
 - e) Draw the labelled constructional diagram of NPN bipolar power transistor. State function of various layers.
 - f) Draw the circuit of 3-phase half wave controlled rectifier and draw its input and output voltage waveforms.
- 6. Attempt any FOUR of the following :** **16**
- a) Describe the working of DC flasher circuit using SCR with neat diagram.
 - b) Draw the circuit of single phase bridge controlled rectifier and explain its working with neat waveforms.
 - c) Draw circuit diagram of class-B commutation of SCR and describe its working.
 - d) Draw constructional diagram of LASCR and describe its working principle.
 - e) Draw V-I characteristics power transistor. What is primary and secondary breakdown ?
 - f) List various commutation methods of SCR and draw class D commutation circuit.
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