

17444

21819

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) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. (A) Attempt any SIX of the following :

12

- (i) State any four applications of SCR.
- (ii) Draw V-I characteristics of IGBT and label the different region.
- (iii) Classify the following triggering devices for SCR & TRIAC.
UJT, SBS, PUT, SUS, DIAC.
- (iv) State any two applications of each chopper and inverter ckt.
- (v) Draw turn ON characteristics of SCR.
- (vi) Define performance parameters of inverter at (i) Total harmonic distortion (ii) Distortion factor.
- (vii) State two applications and advantages of polyphase rectifier.
- (viii) What do you mean by UPS ? State its type.

(B) Attempt any TWO of the following :**8**

- (i) Draw load voltage waveform of half wave controlled rectifier with resistive load for firing angle. (i) $\alpha = 0^\circ$ (ii) $\alpha = 180^\circ$ (iii) $\alpha = 90^\circ$
(iv) $\alpha = 30^\circ$
- (ii) Give the four applications of each inverter and chopper.
- (iii) Draw a block diagram of ON line UPS system and explain it.

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

- (a) Draw single phase half wave controlled rectifier with RL load and explain it with waveform.
- (b) Explain step down chopper with ckt. diagram. State how output is related to duty cycle.
- (c) State the components used in temperature controller industrial ckts., also draw its ckt. diagram. State any four industrial ckts.
- (d) Define the terms :
 - (i) Latching current
 - (ii) Holding current
 - (iii) Firing angle
 - (iv) Conduction angle
- (e) Describe class-A commutation with ckt diagram and waveforms.
- (f) Draw circuit diagram of basic series inverter. Describe its operating principle.

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

- (a) State four applications of TRIAC. Compare SCR and TRIAC. (four points)
- (b) Draw ckt. diagram of 3 ϕ half wave controlled rectifier with resistive load, also draw load voltage waveform for $\alpha = 0^\circ$ & $\alpha = 60^\circ$.
- (c) Draw the transistor analogy of SCR and explain working principle.
- (d) State different operating regions of power transistor. What is primary and secondary breakdown ?
- (e) Draw ckt. diagram of full wave bridge type controlled rectifier with resistive load. Also draw waveform across load and SCR at 30° firing angle.
- (f) A single phase half wave rectifier is used to supply power to load impedance 10Ω from 230 V, 50 Hz A.C. supply at firing angle 60° . Calculate average load voltage.

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

- (a) Explain the working principle of step-up chopper with neat diagram.
- (b) Explain turn-OFF mechanism in GTO.
- (c) Draw ckt. Diagram and write the working principle of emergency light system.
- (d) State different triggering methods and describe RC triggering method for SCR with circuit diagram.
- (e) Draw light dimmer circuit using DIAC and TRIAC. State relation between light intensity and firing angle.
- (f) Draw ckt. diagram of single phase half bridge inverter and explain.

P.T.O.

5. Attempt any FOUR out of the following :**16**

- (a) Compare OFF line UPS and ON line UPS.
- (b) Explain SUS with the help of construction and V-I characteristics.
- (c) Draw mid-point converter with inductive load. Draw the waveforms across load, SCR at firing angle 30° .
- (d) Draw and explain complementary type commutation with waveforms.
- (e) State four applications of IGBT and power transistor.
- (f) Derive the expression of average output voltage and current of single phase half wave controlled rectifier with resistive load.

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

- (a) Draw block diagram of SMPS and describe its working.
 - (b) Draw the circuit diagram of 3ϕ delta-wye rectifier, also draw related waveform. What is maximum conduction of each diode ?
 - (c) State turn ON methods of SCR. Explain $\frac{dv}{dt}$ triggering.
 - (d) Draw equivalent ckt of UJT. Define intrinsic stand off ratio. State its range.
 - (e) Compare power BJT and power MOSFET with respect to (i) Symbol (ii) SiO_2 layer (iii) Switching speed (iv) ON state losses.
 - (f) Explain UJT triggering circuit for SCR with the help of diagram and waveforms.
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