

17444

14115

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) 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 :

12

- (i) Draw the symbols of (a) IGBT (b) PVT (c) LASCR (d) GTO.
- (ii) State any two advantages of IGBT.
- (iii) Draw static characteristics of UJT and define peak point voltage.
- (iv) Define chopper. Classify it.
- (v) Compare forced commutation and natural commutation (any 2 points).
- (vi) Define inverter and classify it.
- (vii) Draw and label single phase centre tapped full wave controlled rectifier with resistive load.
- (viii) Draw labelled block diagram of SMPS. List 2 applications.



P.T.O.

(B) Attempt any TWO :**8**

- (i) Compare controlled and uncontrolled rectifier (any 4 points).
- (ii) Draw step down chopper circuit. State how O/P is related with duty cycle.
- (iii) Draw the labelled circuit diagram of emergency light system.

2. Attempt any FOUR :**16**

- (i) Draw the circuit diagram of 3- ϕ HW rectifier. Sketch the I/P & O/P waveforms for resistive load.
- (ii) Compare between step up & step down chopper (any 4 points).
- (iii) State the working principle of temperature controller circuit using SCR with neat diagram.
- (iv) Draw labelled V-I characteristics of SCR & define (a) Holding current, (b) Latching current.
- (v) Draw class-C commutation circuit. Describe its working with waveform.
- (vi) Draw 1- ϕ HWCR with inductive load. Draw I/P & O/P waveforms. Describe its operation.

3. Attempt any FOUR :**16**

- (i) Differentiate between SCR & TRIAC w.r.t. (a) symbol (b) layer diagram (c) static characteristics (d) applications.
- (ii) Draw 1- ϕ FW bridge controlled rectifier with resistive load. Draw waveforms at (a) I/P (b) Load.
- (iii) Draw equivalent circuit of SCR using BJT. Describe its working principle.
- (iv) Draw the VI characteristics of power transistor and show different operating regions in it, also state what is primary and secondary break down in it.

- (v) Draw the circuit diagram of 1- ϕ half controlled bridge rectifier with resistive load. Sketch I/P and O/P waveforms. Explain its operation.
- (vi) A 1- ϕ FWCR is supplied with a voltage $V = 230 \sin 314 t$. If firing angle ' α ' is 30° find (a) Avg. dc O/P volt. & (b) Current for the load resistance of 100Ω .

4. Attempt any FOUR :**16**

- (i) Draw the neat circuit diagram of step-up chopper. Describe its working with waveforms.
- (ii) Draw the layer diagram of PUT. With neat circuit diagram describe its working as relaxation oscillator.
- (iii) Draw the block diagram of UPS. Explain its working principle in brief.
- (iv) State different triggering methods of SCR. Describe RC triggering method with circuit diagram.
- (v) Draw and describe the operation of light dimmer using DIAC & TRIAC.
- (vi) Show how the O/P volt of step-down chopper can be varied. State its O/P voltage expression and draw its input output waveforms.

5. Attempt any FOUR :**16**

- (i) Draw neat circuit diagram of battery charger using SCR. Describe its working.
- (ii) Draw V-I characteristics of PUT & describe the role of its operating regions.
- (iii) Elaborate the term polyphase rectifier. Describe its need.
- (iv) Draw and explain SCR triggering using UJT with the help of pulse transformer. List its advantages.
- (v) Draw labelled layer diagram of n-ch. IGBT. Draw its V-I characteristics.
- (vi) Compare 1 ϕ HWCR & 1 ϕ FWCR on the basis of (a) No. of SCR diode used, (b) O/P waveform, (c) firing circuit complexity, (d) application.

6. Attempt any FOUR :**16**

- (i) Describe the working principle of controlling the speed of fan using TRIAC.
 - (ii) Describe the effect of freewheeling diode in controlled rectifiers.
 - (iii) Draw labelled circuit diagram of class A and class B commutation circuit for SCR.
 - (iv) Draw (layer) constructional diagram of GTO. Describe its operating principle.
 - (v) Compare power transistor and power MOSFET on the basis of (a) Symbol, (b) Layer diagram, (c) SiO₂ layer, (d) Switching speed.
 - (vi) Compare R-triggering and RC-triggering of SCR on the basis of (a) Circuit diagram, (b) Firing angle ' α ', (c) Cost, (d) Avg. O/P volt.
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