

Vidyalankar

S.Y. Diploma : Sem. IV [ET/EN/EX/EJ/DE/ED/EI/IS/IC/IE/IU]

Power Electronics

Prelim Question Paper

Time: 3 Hrs.]

[Marks : 100

- 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.

1. (a) Attempt any **SIX** of the following: [12]
- (i) Draw the symbol of : (1) SCS (2) SBS
 - (ii) State any two advantages of GTO.
 - (iii) Write classification of choppers.
 - (iv) State any two advantages of poly-phase rectifier.
 - (v) Draw labeled block diagram of UPS.
 - (vi) State turn-ON methods of SCR.
 - (vii) What is commutation and define natural commutation.
 - (viii) What is the need of inverter?
- (b) Attempt any **TWO** of the following: [8]
- (i) Explain how DC voltage is controlled in single phase half wave controlled rectifier with resistive load.
 - (ii) Define Distortion factor and lowest order harmonics with respect to Inverter.
 - (iii) Draw the labeled circuit diagram of battery charger using SCR.
2. Attempt any **FOUR** of the following: [16]
- (a) Draw circuit diagram of three phase controlled rectifier circuit and i/p and o/p waveform.
 - (b) Draw symbol of TRIAC. TRIAC can be operated in how many modes? Which mode is most sensitive?
 - (c) List various commutation methods of SCR and draw class B commutation circuit.
 - (d) Draw V-I characteristics of UJT and describe its different operating region.
 - (e) Draw the labeled constructional diagram of N-channel IGBT.
 - (f) Sketch the diagram of single phase half bridge inverter. Why it is called as half bridge inverter.
3. Attempt any **FOUR** of the following: [16]
- (a) With the help of block diagram, explain On-line UPS.
 - (b) Draw constructional diagram of SCS. How SCS is turned ON and OFF?
 - (c) Draw and explain circuit of full wave controlled rectifier with resistive load using two SCR's.
 - (d) Draw circuit diagram of pulse transformer firing circuit and explain its working.
 - (e) Compare power transistor and power MOSFET with respect to :
 - (i) symbol, (ii) switching speed, (iii) SiO₂ layer, (iv) ON stat losses
 - (f) Draw block diagram of SMPS and describe its working.

4. Attempt any **FOUR** of the following: [16]
- (a) List four applications of inverters. What is the need of inverter?
 - (b) Sketch equivalent circuit of SCR using BJT and justify it.
 - (c) Draw V-I characteristics of SCR and define : (i) Holding current
(ii) Latching current
 - (d) Draw the series resonant commutation circuit for SCR and describe its working.
 - (e) What is poly-phase rectifier? State its need.
 - (f) Show the effect of change of duty cycle on the output voltage of chopper with proper waveforms.
5. Attempt any **FOUR** of the following: [16]
- (a) Draw the neat circuit diagram of class B chopper and draw its input and output voltage waveforms.
 - (b) Draw light dimmer circuit using DIAC and TRIAC.
 - (c) Draw constructional diagram of GTO and State its applications.
 - (d) Differentiate SCR and TRIAC with respect to :
(i) symbol, (ii) Layered diagram, (iii) operating quadrant, (iv) application
 - (e) State different operating regions of power transistor. What is primary and secondary break down.
 - (f) Using UJT relaxation oscillator, how SCR can be fired?
6. Attempt any **FOUR** of the following: [16]
- (a) A single phase full wave controlled rectifier is supplied with $V = 230 \sin (314 t)$, find average output DC voltage and current of firing angle is 45° and load resistance is 100Ω .
 - (b) Draw circuit diagram of 2-Quadrant chopper and explain its working.
 - (c) List any four application of power MOSFET. Why thermal Run away does not takes place in power MOSFET?
 - (d) State the effect of free-wheel diode with suitable waveform in controlled rectifier.
 - (e) Define distortion factor and lowest order harmonics with respect to inverter.
 - (f) Compare linear regulator with SMPS.

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