

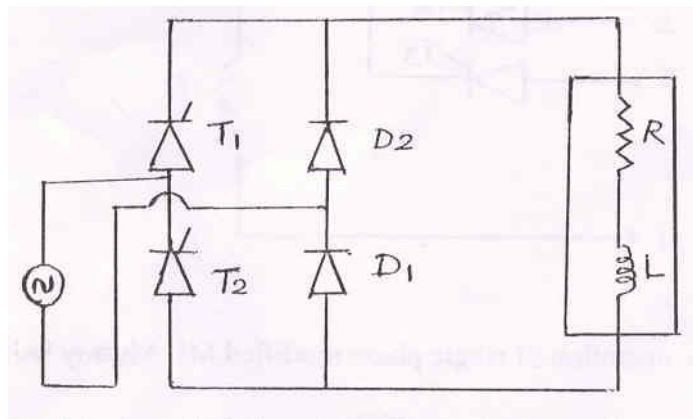
**MODEL QUESTION PAPER**  
**B.E. ELECTRICAL AND ELECTRONICS ENGINEERING**  
**SEMESTER V**  
**EE 332 - POWER ELECTRONICS**

**Time : 3 Hrs**

**Max. Marks: 100**

**PART - A (10 x 2 = 20 Marks)**

1. What are the differences between Transistor & SCR?
2. Explain latching current and holding current of thyristor.
3. What is natural or line commutation?
4. Why is power factor of semiconverter better than full converter?
5. What are the differences between free wheeling diode and feedback diode?
6. What are the main differences between voltage source inverter and current source inverter?
7. What are the advantages and disadvantages of AC voltage controllers?
8. Explain time ratio control of choppers.
9. Draw the load voltage waveform for  $\alpha = 150^\circ$ .



10. Explain the principle of operation of step up chopper.

**PART - B (5 x 16 = 80 Marks)**

11. A dc battery is charged through a resistor R as shown in fig.1. Derive an expression for the average value of charging current in terms of  $V_m$ , E, R on the assumption that SCR is fired continuously.

- For an ac source voltage of 230V, 50Hz find the value of average charging current for  $R = 8\Omega$  and  $E = 150V$
- Find the power supplied to battery and dissipated in the resistor.
- Calculate supply PF.

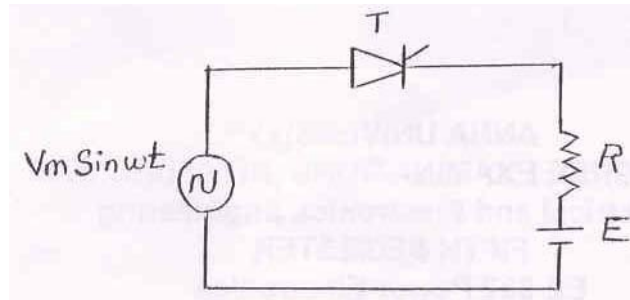


Fig. 1

- 12.a) For three phase thyristor controlled half wave rectifier feeding load  $R$  as shown in fig. 2. Show that the average output voltages are given by

$$V_o = (3\sqrt{3} V_m \cos \alpha) / 2\pi \quad \text{for } 0 \leq \alpha \leq \pi/6$$

$$V_o = (3/2\pi) V_m [1 + \cos(\alpha + \pi/6)] \quad \text{for } \pi/6 \leq \alpha \leq 5\pi/6$$

Where  $V_m$  is the maximum value of phase voltage and  $\alpha$  is the firing angle delay.

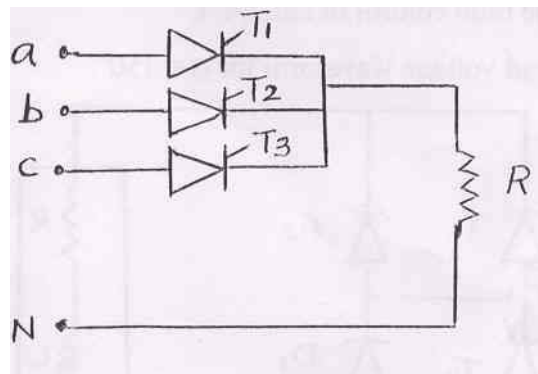


Fig. 2

(OR)

- A half controlled 3 phase bridge rectifier is supplied at 220v from a source of reactance  $0.24\Omega/\text{phase}$ . Neglecting resistance and device volt drops determine mean load voltage for level load current of 40A at a firing delay angle of  $45^\circ$  and  $90^\circ$ .
- Explain the operation of single phase modified MC Murray half bridge inverter

(OR)

- Explain the operation of modified series inverter with neat diagram. Derive an expression for the output frequency of the inverter.

ii) What is the difference between series and parallel inverter?

14.a) Explain the operation of voltage commutated chopper with neat diagram and waveforms. Derive expressions for commutating capacitor (C) and commutating inductor (L).

**(OR)**

14.b) For a current commutated chopper peak commutating current is twice the maximum possible load current. The source voltage is 230V dc and main SCR turn of time is  $30\mu\text{sec}$ . The circuit turn off time is twice device turn off time. For maximum load current of 200A calculate.

- (i) Values of the commutating inductor and capacitor
- (ii) Maximum capacitor voltage
- (iii) Peak commutating current

15.a) Explain the operation of multistage sequence control of ac voltage controllers with neat diagram.

**(OR)**

15.b) Explain the operation of single phase to single phase step down cyclo converter with voltage and current waveforms for

- (i) Continuous load current
- (ii) Discontinuous load current

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