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3 Hours / 100 Marks Seat No. | | | | | | | | |

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.

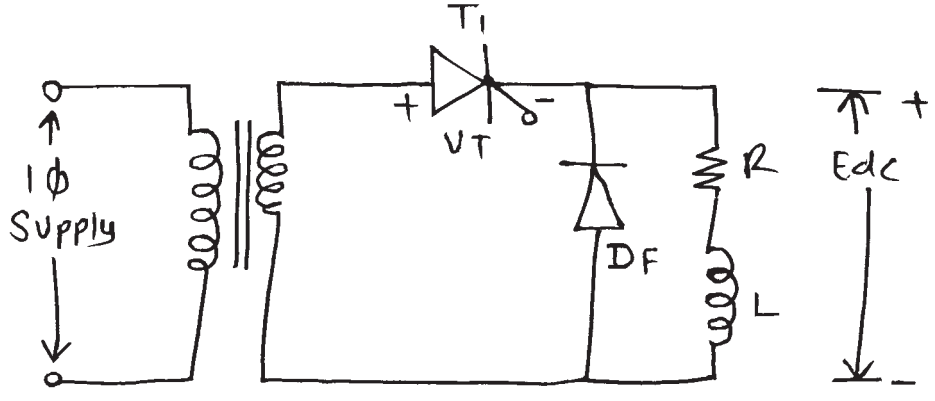
(5) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. a) **Attempt any <u>THREE</u> of the following:** **12**

(i) Draw construction of SCR using two transistor model. Explain its operation.

(ii) Draw waveform of the following power electronic circuit, also identify the name of the circuit. Refer Fig. No. 1



<u>Fig. No. 1</u>

(iii) Draw circuit diagram of single phase full bridge inverter. Draw waveform of load voltage and load current for RL load.

P.T.O.

Marks

(iv) State the classification of chopper commutation methods and describe any one of them.

b) **Attempt any ONE of the following:** **6**

(i) Describe operation of 3 ϕ full controlled bridge converter with RL load using neat circuit diagram. Sketch different i/p, o/p waveform.

(ii) With the help of neat circuit diagram and necessary waveform, explain class C chopper.

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

a) State the meaning of holding current and latching current. Label them on the VI characteristics of SCR.

b) State the effect of source impedance on the performance of 1 ϕ fully controlled converter.

c) State differences between MOSFET and thyristor inverter.

d) State the application of chopper and list the various control techniques of chopper.

e) Explain the technique for speed control of D.C series motor using thyristor converter.

f) Describe thyristorised induction heating.

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

a) Draw symbols and V-I characteristics for:

(i) TRIAC

(ii) GTO

(iii) DIAC

(iv) 1GBT

b) Explain the operation of cyclo converter with a neat diagram.

c) Draw and explain the circuit diagram of single phase half bridge inverter.

Marks

d) Describe how control of firing angle can control speed of D.C shunt motor controlled by thyristor converter.

e) Describe working of basic current source inverter (CSI) based induction motor control.

4. a) **Attempt any <u>THREE</u> of the following:** **12**

(i) Draw equivalent circuit of thyristor mounted on heat sink. Indicate thermal resistances.

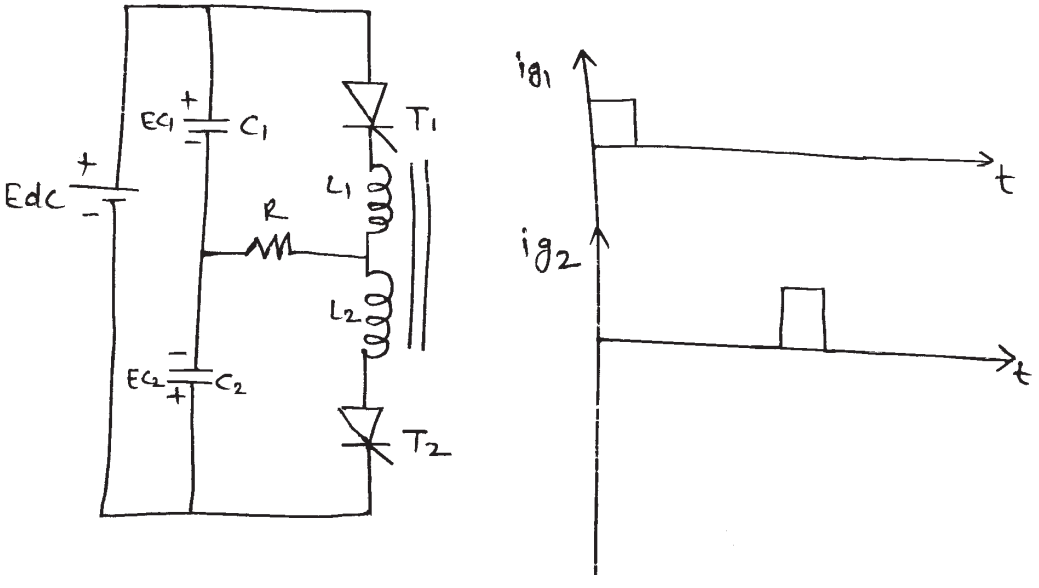
(ii) What is converter? List the types of converter. State the function of free wheeling diode in converters.

(iii) With the help of neat circuit diagram explain working of sinusoidal pulse with modulation.

(iv) Draw a schematic of step up chopper and explain it.

b) **Attempt any <u>ONE</u> of the following:** **6**

(i) Draw waveforms of the following power electronic circuit for gate pulses pattern shown in Fig. No. 2 indicate load voltage, current, capacitor voltage.



<u>Fig. No. 2</u>

ii) Describe speed control of 3 ϕ IM using voltage source inverter. What is the need of controlling VIF ratio.

Marks

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

a) State the meaning of commutation. Explain class B method of commutation.

b) Write the specifications/rating of SCR:

(i) voltage

(ii) current

(iii) power

(iv) temperature

c) With a neat circuit diagram explain the working principle of 1 ϕ fully controlled half wave converter with resistive load. Draw the waveform across load for firing angle 90°.

d) Draw circuit diagram of 3 ϕ series inverter and describe its operation.

e) Draw schematic circuit diagram of thyristorized battery charges.

f) Describe use of thyristor in static VAR compensation.

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

a) What are different turn-ON methods of SCR? Explain any one method.

b) Differentiate between single and three phase controlled converter on the basis of efficiency, ripple factor, RMS values and average values.

c) State different methods to control the output voltage of inverter. Explain PWM method.

d) With a neat circuit diagram, explain the working principle of Jones Chopper.

e) Describe working principle of dielectric heating using thyristor.