

REVISED COURSE  
(3 Hours)

Total Marks: 80

- N. B. 1) Question No. 1 is compulsory.  
2) Attempt any three questions out of the remaining five questions.  
3) Figures to the right indicate full marks.  
4) Assume suitable data wherever required but justify the same.

Q1 Answer any four

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- Compare the various triggering methods of thyristors.
- What is the need of freewheeling diode in rectifiers? Explain with an example.
- Draw and explain VI characteristic of TRIAC.
- Explain the commutation techniques for SCR. Draw any one, forced commutation circuit.
- Explain various control strategies for DC-DC converter.

Q2 a) Draw and explain single phase fully controlled converter with RL load. Draw load current, load voltage input voltage and gating signal for  $\alpha = 60^\circ$ .

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b) Explain the working of three phase bridge inverter in 180 degree conduction mode with circuit diagram and waveforms.

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Q3 a) A single phase full bridge inverter has a resistive load of  $10 \Omega$  and dc input voltage of 48 V.

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Calculate : i) RMS output voltage  $V_{rms}$

ii) RMS output voltage at fundamental frequency  $V_{(01)_{rms}}$

iii) Total Harmonic Distortion (THD)

iv) Average and peak current of each thyristor

b) Explain working principle of single phase cyclo converter with circuit diagram and waveforms.

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Q4. a) A single phase fully controlled converter is operated from 230V, 50Hz ac supply. The load resistance is 10 Ohms. The average output voltage is 10% of max possible average output voltage.

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Calculate:- i) Firing angle

ii) RMS and Average output current

iii) Efficiency

iv) Displacement Factor (DF)

b) Draw and explain the working of  $3\Phi$  fully controlled rectifier with neat circuit diagram and Waveforms.

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Q5. a) Draw and explain AC voltage control circuit using DIAC and TRIAC. Draw the waveforms with  $\alpha = 45^\circ$ .

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b) Draw and explain Boost converter with waveforms. Also derive the expression for output voltage.

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Q6. Write short notes on (Any three)

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- Compare IGBT, MOSFET and GTO.
- Protection circuits for SCR.
- Driver circuits for power transistors.
- Voltage control of inverters using PWM techniques.