

Code No: 09A50205

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

B. Tech III Year I Semester Examinations, November/December-2013

POWER ELECTRONICS

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

- 1.a) Define Latching and holding currents. Show these currents on static V-I characteristics of SCR and explain.
b) Justify the statement "gate loses control once thyristor is fired when anode current is greater than latching value". [7+8]
- 2.a) Draw a snubber circuit for an SCR. How does it provide dv/dt protection? How can elements of this circuit be calculated?
b) A Thyristor commutation circuit has L and C in series with load resistance R, If $R=0.7\Omega$, $L=12\mu\text{H}$ And $C=60\mu\text{F}$, check that the circuit is under damped, find time of conduction of Thyristor. [7+8]
3. Draw and explain the wave shapes of supply voltage, output voltage, load current, current through SCR, current through freewheeling diode and voltage drop across SCR of a single phase half wave controlled rectifier feeding RL load. [15]
- 4.a) A single phase full converter bridge circuit is feeding a RLE load and is fed from 230V, 50Hz, single phase mains. The load current is constant at 15 A, $R=0.5\Omega$, $L=0.3\text{H}$, find
i) Firing angle if $E=100\text{V}$
ii) Input power factor.
b) Draw and explain the operation of a single phase fully controlled converter. In what respects is the operation of this circuit different for R, RL, and RLE loads. [7+8]
- 5.a) Discuss the operation of a three phase dual converter in detail.
b) Derive an expression for output voltage of a three phase converter including the effect of source inductance. [7+8]
- 6.a) Explain the operation of a single phase ac voltage controller with R load and derive all the necessary equations.
b) Explain the operation of a cycloconverter. Mention the applications of cycloconverter. [7+8]
- 7.a) Explain the principle and operation of Jones chopper.
b) A dc chopper has a input voltage of 230V and an output voltage of 150V, it is operating at a frequency of 1kHz. Find the periods of conduction and blocking in each cycle. [7+8]
8. Write short notes on the following:
a) IGBT.
b) Pulse width modulation techniques.
c) Mc Murray – Bedford inverter. [15]
