

M.E. DEGREE EXAMINATIONS: JANUARY 2011

First Semester

POWER ELECTRONICS AND DRIVES

PED503: Analysis of Power Converters

Time: Three Hours

Maximum Marks: 100

Answer All Questions:-

PART A (10 x 2 = 20 Marks)

1. Input power factor of semi converter is better than full converter. Why?
2. Draw the graph of output voltage of semi converter for the variation of firing angle from 0° to 180° .
3. What is the role of free wheeling diode in power converters?
4. What is meant by inverter operation of fully controlled converter?
5. Write the expression for the output voltage of step up chopper in terms of the duty cycle.
6. What are the advantages of resonant converters?
7. What are the applications of AC voltage controllers?
8. What are the control methods used in AC voltage controllers?
9. What is step up cyclo converter?
10. What are the applications of cyclo converters?

PART B (5 x 16 = 80 Marks)

11. a) Draw and explain the circuit and waveforms of single phase fully controlled bridge converter with R-L-E load for continuous conduction. Derive the expression for output voltage.

(OR)

- b) A single phase semi converter is connected to 120V, 60 Hz supply and R-L-E load. The load current is continuous and the ripple content is negligible. Express the input current in Fourier series. If the delay angle is 90° , calculate V_{dc} , V_{rms} , HF, DF and power factor.

12. a) Draw and explain the circuit and waveforms of three phase semi converter with R-L load. Derive the expression for output voltages V_{dc} and V_{rms} .

(OR)

- b) Draw and explain the circuit and waveforms of three phase dual converter. Derive the expression for circulating current.

13. a) Draw and explain the circuit and waveforms of buck-boost converter. Derive the expression for output voltage, output current, ripple current and ripple voltage of capacitor.

(OR)

- b) Obtain the expressions for maximum current and minimum current and steady state ripple current of step down DC chopper feeding R-L-E load using steady state analysis.
14. a) A single phase full wave AC voltage controller has a resistive load of 10Ω and input voltage of 120V, 60Hz. The delay angles of thyristors are equal to 90° . Determine rms output voltage, input power factor, average current of thyristors and rms current of thyristors.

(OR)

- b) Draw and explain the circuit and waveforms of three phase bidirectional AC voltage controller with star connected balanced R load. Derive the expression for output voltage.
15. a) Draw and explain the circuit and waveforms of single phase cyclo converter with R-L load. Show the variation of output frequency and voltage.

(OR)

- b) (i) Draw and explain the circuit of a three phase cyclo converter. (8)
- (ii) Draw and explain the scheme of cyclo converter control. (8)
