

Roll No:

KARPAGAM COLLEGE OF ENGINEERING, COIMBATORE -641032.
BE-ELECTRICAL AND ELECTRONICS ENGINEERING Semester: VI
12E605 POWER ELECTRONICS
Continuous Internal Assessment: II

Date:24/2/2016

Session:FN

Time: 1½ Hours
Maximum: 50 Marks

Answer ALL Questions PART-A (10 x 2 = 20)

- A1. Differentiate Controlled rectifier and Uncontrolled rectifier.
- A2. Give the expression of average DC load voltage of single phase fully controlled converter with R load.
- A3. State the condition to make fully controlled rectifier to operate in inversion mode.
- A4. Write the range of firing angle and extinction angle in fully controlled rectifier.
- A5. Draw the circuit diagram of single phase dual converter.
- A6. Compare constant frequency control with variable frequency control.
- A7. Write down the expression of average output voltage for step up and step down chopper.
- A8. Define Current Limit Control.
- A9. Determine the output voltage of boost converter with 20% duty cycle fed from an 80V DC source.
- A10. Draw the circuit diagram of Cuk converter.

Answer ALL Questions PART-B (2x15 = 30)

- B1. (a) (i) Explain the operation of single phase fully controlled thyristor bridge rectifier with RL Load. (6)
(ii) Derive an expression for average dc load voltage, load current, RMS voltage and RMS current of single phase full-converter with RL load. (5)
(iii) Compare half controlled rectifier with fully controlled rectifier. (4)

(OR)

- (b) (i) Discuss the operation of three phase fully controlled converter feeding R load with necessary diagrams. (6)
(ii) A single phase full wave converter is operated from a 120v, 60Hz for a resistive load of 10ohm. If the average output voltage is 25% of maximum possible average output voltage, find i) the delay angle ii) average and rms output current. (5)
(iii) Derive an expression for average dc load voltage, load current, RMS voltage and RMS current of single phase semiconverter with Rload. (4)

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- B2. (a) (i) Discuss the principle of operation of a buck converter with suitable diagrams and derive its output voltage. (6)
- (ii) Derive the output voltage equation, peak to peak ripple current of inductor, peak to peak capacitor voltage ripple of buck converter. (5)
- (iii) A boost regulator has an input voltage of 10V. The average output voltage is 15V and the average load current is 0.4A. The chopping frequency is 20kHz. Assume the value of inductor is 100H. Calculate the duty ratio, ripple current of inductor. (4)

(OR)

- (b) (i) Draw the circuit diagram of buck-boost converter and explain its operation with equivalent circuit for different modes and waveforms. (6)
- (ii) The buck-boost regulator has an input voltage of 12 v. The duty cycle is 0.25 and the switching frequency is 25 kHz. The inductance $L=150\text{H}$ and filter capacitance $c=220\text{F}$. the average load current is 1.25 A. Determine a) the average output voltage, b) the peak to peak output voltage ripple, c) the peak to peak output current ripple. (5)
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