

Code No: I4302/R16

M. Tech. I Semester Regular Examinations, December-2016

ANALYSIS OF POWER ELECTRONIC CONVERTERS

Common to Power Electronic (43),PI&D(42),PE & ED(54),PE & D (52),PE & S(12), EM & D(44) and Power Electronics & Power Systems (99)

Time: 3 Hours

Max. Marks: 60

*Answer any FIVE Questions
All Questions Carry Equal Marks*

1. a Draw the load current waveforms PWM control based 1ϕ phase ac voltage controller with R and R-L loads, Briefly describe its operation? 6 M
b A three phase ac voltage controller feeds a balanced star connected R-L load. The value of resistance is $10\ \Omega$ and inductance is 6.5mH . The controller is fed from a 3-phase supply of 400V , 50Hz . Determine for a firing angle of 30° , the values of i) rms load current ii) rms load voltage iii) Power factor. 6 M
2. Describe the operation of fully controlled 3ϕ phase ac voltage controller used for star connected load of non-isolated neutral, for the firing angle of
(a) $60^\circ \leq \alpha \leq 90^\circ$ 6 M
(b) $90^\circ \leq \alpha \leq 150^\circ$ 6 M
3. a A single phase semi converter is connected to RLE load. The source voltage is 230V , 50Hz . The average load current of 10A is continuous over the working range. For $R = 0.5\ \Omega$ and $L = 2\text{mH}$, compute firing angle delay for $E = 120\text{V}$. 6 M
b Describe the operation of sinusoidal PWM control based 1ϕ full converter? 6 M
4. a A three-phase, half wave converter is operated from a 3-phase, Y-connected 440V , 50Hz supply and the load resistance is $R = 20\ \Omega$. If it is required to obtain an average output voltage of 50% of the maximum possible output voltage, calculate:
i. Firing angle,
ii. Rectification efficiency and
iii. Input power factor. 6 M
b Deduce the harmonic performance factors of series 1ϕ semi converter? 6 M
5. Deduce the steady state analysis of single stage boost power factor corrected 1ϕ rectifier? 12 M
6. Explain single phase bridge inverter control by 12 M
a) 60 Degree PWM
b) Third Harmonic injection PWM?

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7. Describe the 1ϕ phase flying capacitors multilevel inverter operation? Compare its features with 1ϕ phase diode-clamped multilevel inverter? 12 M
8. Describe the operation of
(a) Current source inverter 12 M
(b) Three phase boost PFC
