

SWITCHED MODE POWER CONVERSION

(Common to PE, P&ID, PE&ED, PE&D, EM&D and PE&PS)

Time: 3 Hours

Max. Marks: 60

*Answer any FIVE Questions
All Questions Carry Equal Marks*

- | | | | |
|----|---|---|-----|
| 1. | a | Explain the operation of buck converter with neat circuit and waveforms in Continuous conduction mode | 6M |
| | b | In a buck-boost converter operating at 20 kHz, $L = 0.05$ mH. The output capacitor is sufficiently large and $V_d = 15$ V. The output is to be regulated at 10V and converter is supplying a load of 10 W. Calculate the duty ratio D . | 6M |
| 2. | a | Explain the operation of Buck-Boost converter with neat circuit and waveforms in continuous conduction mode | 6M |
| | b | Draw the circuit diagram of a buck converter including non idealities in the components. Explain the effect of non idealities on the performance of the converter. | 6M |
| 3. | a | Explain frequency characteristics of series and parallel resonant circuit | 4M |
| | b | Explain the operation of zero current switching Quasi-resonant boost converter with neat circuit and waveforms | 8M |
| 4. | a | Explain the operation of zero current switching Quasi-resonant buck converter with neat circuit and waveforms | 8M |
| | b | Compare ZVS and ZCS topologies | 4M |
| 5. | a | Explain the operation of half-bridge dc-dc converter with neat circuit and waveforms | 6M |
| | b | Explain the operation of fly back converter with neat circuit and waveforms. | 6M |
| 6. | a | Explain Voltage-mode control for switch mode converters | 6M |
| | b | Briefly explain about DC inductor and capacitor design considerations | 6M |
| 7. | | Obtain the steady state solution of the non-ideal boost converter by using its average model | 12M |
| 8. | | Derive the transfer function and Obtain the gain and phase plot of the non-ideal boost converter | 12M |