

國立臺北科技大學

九十八學年第一學期電機系博士班資格考試

電力電子學試題

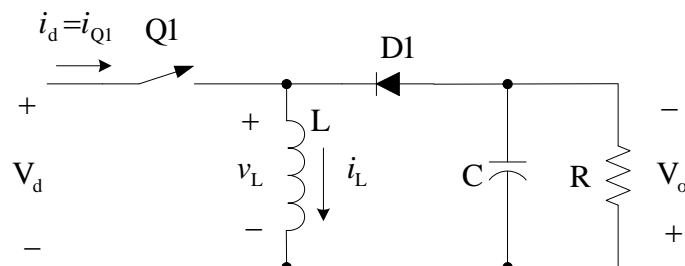
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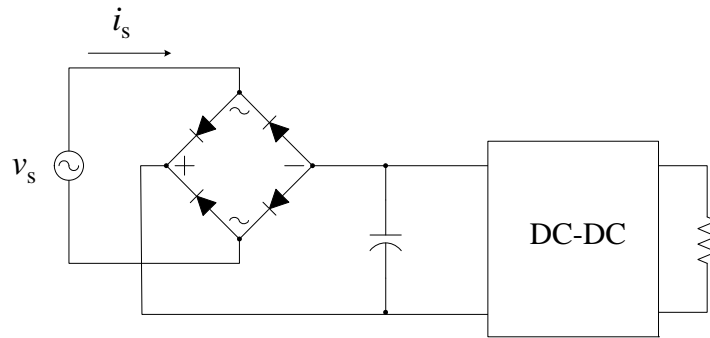
注意事項：

1. 本試題共六題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在試卷答案欄內，否則不予計分。
4. 考試時間：二小時。
5. 可使用計算器。

1. Please briefly and diagrammatically illustrate the differences between the conventional linear power supplies and the switching power supplies. 15%
2. In Boost converter operating in discontinuous current conduction mode (DCM) under switching frequency 50kHz, the output voltage is regulated at 48V by modulating the duty cycle while the input voltage varies from 12V to 36V, and the maximum output power equals to 120W, please design the desired inductance if all the elements are ideal and the output capacitance is large enough. 15%
3. Please illustrate the operations of Buck-Boost converter operating in continuous current conduction mode (CCM) as shown below, including equivalent circuits, the waveforms on the inductor, the voltage ratio and the ripple analysis. 25%



4. Please explain the function of Pulse-Width-Modulation (PWM) and illustrate its implementation. 15%
5. Please draw the source voltage and the source current in the peak-rectifier as below and illustrate the factors affecting Power Factor (PF). 10%



6. The corresponding waveforms on a power switch are shown below, wherein i_T is the switch current and v_T is the switch voltage. Please calculate the total power loss on the power switch. 20%

