# 國 立 臺 北 科 技 大 學

## 九十六學年第一學期電機系博士班資格考試

## 電力電子電路分析與設計試題(公告用)
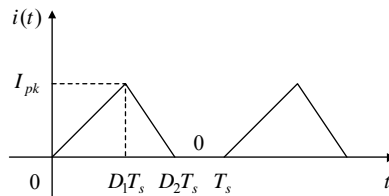
注意事項：

1. 本試題共【4】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。

1. Find the DC conversion ratio of the boost converter operated in DCM in terms of switching period (Ts), input inductance (L), output resistance (R) and duty cycle (D). (25%)

2. Calculate the rms current value of the following waveform. (25%)



3. The parameters of the flyback converter are shown in Table 1. Please find answers of the blank space as shown in Table 2. (25%)

Table 1

| $V_{in,max}$ | 390V |
|---|---|
| $V_{in,min}$ | 260V |
| $V_o$ | 15V |
| $P_{load,max}$ | 200W |
| $P_{load,min}$ | 50W |
| Switching frequency | 100kHz |
| $\Delta v_{o,max}$ | 0.1V |
| Turns ratio $(n_2/n_1)$ | 0.125 |
| $\Delta i_L$(peak to peak) | 3A referred to the secondary |

Table 2

| $D_{max}$ | |
|---|---|
| $D_{min}$ | |
| L | |
| C | |
| Switch stress voltage | |
| Switch stress current | |
| Diode stress voltage | |
| Diode stress current | |

4.  Find the average value of the input current for the buck converter at boundary between continuous and discontinuous conduction in terms of switching frequency (fs), output inductance (L), duty cycle (D) and output voltage (Vo). (25%)