University of Glasgow

DEGREES OF MENG, BENG AND BSC (HONS) IN ENGINEERING

POWER ELECTRONICS 2 (ENG2045, SIT2004)
Answers to past examination papers

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2016 May 3

I did not set any of these papers myself so the answers are not taken from the official solutions and are therefore not guaranteed! Please let me know if think that you have found an error and I'll check.

2015 May 8

Q1 (a) No numerical answer

(b) $V_{\text{pri,ave}} = 0$, $V_{\text{pri,rms}} = 7.1\,\text{V}$, $V_{\text{sec,ave}} = 0$, $V_{\text{sec,rms}} = 14.1\,\text{V}$

(c) No numerical answer

(d) $I_{\text{ave}} = 0.64\,\text{A}$, $I_{\text{rms}} = 1.00\,\text{A}$

(e) $I_{\text{ave}} = 0.59\,\text{A}$

(f) 20 V

Q2 (a) No numerical answer

(b) This material is not examinable in 2015–16.

(c) 33.3 mA

(d) 1.45 A

Q3 (a) No numerical answer

(b) $> 15\,\text{V}$

(c) (i) No numerical answer

(ii) 10.1 W

(iii) 5.6 W

(iv) 15.7 W

Q4 (a) No numerical answer

(b) No numerical answer

(c) 79.6%

(d) No numerical answer

(e) $I_{\text{pk}} = 19.1\,\text{A}$

Q5 This material is not examinable in 2015–16.

2014 May 9

Q1 (a) No numerical answer

(b) $P_{\text{conduction}} = 15\,\text{W}$, $P_{\text{switching}} = 6\,\text{W}$, $P_{\text{total}} = 21\,\text{W}$. Switching loss in diodes is not examinable in 2015–16 but will be in future.

(c) No numerical answer

Q2 (a) $2 \times 10^6\,\text{A s}^1$

(b) 125 kHz

(c) $I_{\text{ave}} = (21/8)\,\text{A} = 2.6\,\text{A}$

(d) $I_{\text{rms}} = \sqrt{13.5}\,\text{A} = 3.7\,\text{A}$, FF = 1.4

Q3 (a) No numerical answer

(b) $I_{\text{pk,diode}} = I_{\text{pk,switch}} = 20\,\text{A}$, $I_{\text{ave,diode}} = 6\,\text{A}$, $I_{\text{ave,switch}} = 4\,\text{A}$

(c) $P_{\text{conduction}} = 1.0\,\text{W}$, $P_{\text{switching}} = 0.6\,\text{W}$, $P_{\text{total}} = 1.6\,\text{W}$, efficiency = 98.4%

Q4 The numbers for this question depend on your assumptions (such as the forward voltage drop across the diodes) so yours may not agree perfectly with mine.

(a) No numerical answer

(b) No numerical answer

(c) (i) peak-to-peak ripple = 6.4 V, C1 = 5.4 mF

(ii) 26 W

(d) No numerical answer

(e) (i) 10 W

(ii) 1.0 °C/W

Q5 This material is not examinable in 2015–16.

2013 May 7

Q1 (a) No numerical answer

(b) (i) No numerical answer

(ii) 1.5 °C/W

(c) This material is not examinable in 2015–16.

Q2 (a) 3×10^3 A s^{-1}

(b) 111 Hz

(c) 18.0 A

(d) 3.0 A

(e) 6.7 A

Q3 This material is not examinable in 2015–16.

Q4 (a) No numerical answer

(b) No numerical answer

(c) 1.8 kW, 7.7 W; note that 400 V in the question is an RMS value

Q5 This material is not examinable in 2015–16.