Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Science and Technology
400 level 1st Semester Examination – Jul. / Aug. 2016
SCT 464-2 Power Electronics

Uva Wellassa University

Instructions to candidates
Duration: Two (02) hour
Number of questions: Four(04) Essays
Mark allocation: 100 marks
Answer all questions.

1.

a. What is power electronics? Explain giving examples. (04 marks)

b. Draw the I/V characteristics of the following devices under ideal conditions (06 marks)

i. PN junction diode

ii. IGBT

iii. MOSFET

c. Write short notes on any 3 topics (15 marks)

i. Power switches

ii. Power converters

iii. Applications of power electronics

iv. Power inverters

2.

a. Compare and contrast switch mode power supplies and linear power supplies (04 marks)

b. A buck converter operates in continuous conduction mode. Find L and C values. V_{in}= 100V, f_{sw}= 10kHz, V_{out}= 10V, Δv= 1%, 1Watt<Pload<10Watt. (06 marks)

c.

i. In a boost converter Vin= 12V L= 0.1mH fsw= 5kHz R= 100Ω. What are the output voltage for D=0.1 and D= 0.9? (10 marks)

ii. What is maximum resistance value to ensure that the boost converter always operates on continious conduction mode? (05 marks)

(3)

(17)

3.

a. What are the different turn on methods and turn off methods of SCR? (10 marks)

b. What is snubber circuit? (05 marks)

c. What is meant by SOA? (05 marks)

d. For high voltage applications what would you prefer MOSFET or IGBT Justify your answer.

(05 marks)

e. What are the different types of thyristors? (05 marks)

4. Design a battery charger using power electronic devices. Give reasons for selecting those components.

(20 marks)