

Instructions to candidates

Duration: Two (02) hour

Number of questions: Four(04) Essays

Mark allocation: 100 marks

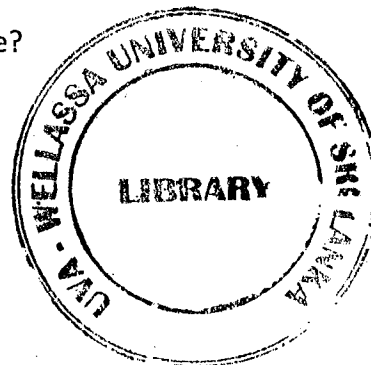
Answer all questions.

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. $V_{in}=100V$, $f_{sw}=10kHz$, $V_{out}=10V$, $\Delta v=1\%$, $1Watt < P_{load} < 10Watt$. (06 marks)
- c.
- i. In a boost converter $V_{in}=12V$, $L=0.1mH$, $f_{sw}=5kHz$, $R=100\Omega$. 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 continuous conduction mode? (05 marks)



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)