Reg. No. :

Question Paper Code: 92052

M.E. DEGREE EXAMINATION, OCTOBER - 2014.

Elective

Power Electronics and Drives

01PPE512 – SWITCHED MODE POWER CONVERSION

(Regulation 2013)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. What is the significance of reactive components in power electronics?

2. What are ESR and ESL?

3. Compare linear power supplies and SMPS?

4. What is the difference between isolated and non - isolated converters?

5. Define duty ratio of converter.

6. What are the advantages of sliding mode control?

7. What is the working principle of resonant converters?

8. What is the main advantage of zero voltage switching?

9. State the control specifications of the converter.

10. What are active filters?

PART - B (5 x 14 = 70 Marks)

11. (a) (i) Explain the design of inductor for power electronics applications. (7)

      (ii) Write detailed notes on commutation capacitors and resonant capacitors. (7)

Or

(b) Discuss in detail about the design of transformer for power electronics application. (14)

12. (a) With reference to the Buck – Boost converter, explain the CCM operation and DCM operation. Also draw the relevant waveforms. (14)

Or

(b) (i) Explain the principle of operation of fly back converter and derive the expression for the inductor current and voltage across the switch during ON and OFF intervals. (7)

      (ii) With neat circuit diagram and waveforms, explain the operation of practical forward converter. (7)

13. (a) Discuss the following

      (i) Sliding mode control of power converter (7)
      (ii) Dynamic analysis significance in power converter. (7)

Or

(b) Derive the steady state DC voltage transfer function V_o / V_s of the power stage including the output filter for buck converter operating in CCM using state space averaging technique. (14)

14. (a) With neat circuit diagram and waveforms, explain the operation of zero voltage switching resonant converter. (14)

Or

(b) Explain the methods of realizing UPF operation in a boost converter. (14)

15. (a) (i) Explain the steps involved in the design of controllers using Bode plot for a DC - DC Converter. (7)

      (ii) Draw the electric circuit model of PI, PD and PID controllers. (7)

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Or

(b) (i) Briefly explain about power conditioners. (7)

(ii) Briefly explain about power line disturbances. (7)

PART - C (1 x 10 = 10 Marks)

16. (a) Explain the operation of ON line UPS with help of a block diagram. (10)

Or

(b) Draw and explain the closed loop control configuration of the power converter. (10)

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