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Question Paper Code : 87048

M.E. DEGREE EXAMINATION, MAY/JUNE 2016

Elective

Power Electronics and Drives

PX 7002 – SMPS AND UPS

(Regulations 2013)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. How do you choose the duty ratio of the buck-boost converter for buck and boost operations respectively ?
2. What are the differences between Buck-Boost and Cuk regulators ?
3. What is a switched mode power supply ?
4. What is a flyback converter ?
5. What do you mean by ZVS ?
6. How does a parallel resonant inverter differ from a parallel inverter ?
7. Why higher levels are not possible with flying capacitor multilevel inverter ?
8. List the various harmonics elimination techniques.
9. What are the strategies adopted for selecting the filter capacitors ?
10. Distinguish between 'short break' UPS and 'No break' UPS ?

PART – B (5 × 13 = 65 Marks)

11. (a) Explain the principles of step-down and step-up converters.

OR

- (b) With a neat power circuit diagram, explain the working of Cuk converter. Also develop its state space model.

12. (a) With a neat power circuit diagram, describe the operation of a Luo converter. Draw necessary equivalent circuits and relevant waveforms. Also develop its state space model.

OR

- (b) Describe in detail the PWM techniques employed in switched mode power converters.

13. (a) (i) Explain the working of ZVS resonant converter.
(ii) Discuss the basic principle of working of resonant converters and its various classifications.

OR

- (b) A parallel resonant inverter delivers a load power of $P_L = 1$ kW at a peak sinusoidal load voltage of $V_p = 170$ V and at resonance. The load resistance is $R = 10 \Omega$. The resonant frequency is $f_0 = 20$ kHz. Determine

- (i) The dc input current
(ii) The quality factor Q_p if it is required to reduce the load power to 250 W by frequency control so that $u = 1.25$.
(iii) The inductor and
(iv) The capacitor

14. (a) Explain the single phase and three phase inverters.

OR

- (b) With a neat sketch, explain the voltage control of three phase inverters
(i) with SPWM
(ii) with SVM

15. (a) (i) Explain the necessity of using power conditioners.
(ii) Discuss the role of filters used for pulse width modulated VSI.

OR

- (b) (i) With a neat schematic, explain the working of online UPS.
(ii) Write a short note on DC filters.



PART – C (1 × 15 = 15 Marks)

16. (a) With a neat power circuit diagram, explain the working of Boost converter. Draw the necessary equivalent circuit and waveforms to explain its operation. Derive the expression for its output voltage.

OR

- (b) With a neat power circuit diagram, explain the working of three phase cascade type multilevel inverter. Consider three cells for each phase. Discuss in detail on the number of levels at the output and number of components required for the circuit. Draw the appropriate output.