G 7144

M.E. DEGREE EXAMINATION, JANUARY 2006.

First Semester

Power Electronics and Drives

PE 1604 — ANALYSIS OF INVERTERS

(Regulation 2005)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the parameters involved in the selection of thyristor for inverter.

2. State the purpose of feed – back diode in an inverter.

3. What are the reasons for adding a filter on the inverter output?

4. What are the methods for voltage control within the inverters?

5. What are the advantages and disadvantages of CSI?

6. What are the main difference between VSI and CSI?

7. What are the limitations of series inverter?

8. Give reasons to vary the output voltage of the inverter, for industrial applications.

9. What is the necessary condition for series resonant oscillation?

10. What is the class E resonant inverter?

PART B — (5 × 16 = 80 marks)

11. State the need for reduction of harmonics in inverters. Explain the method of harmonic reduction in the inverter output voltage by single PWM, by transformer connection, by stepped wave inverters and by multiple commutation in each half cycle.   (4 + 12)

12. (a) Discuss the principle of working of a 3 phase bridge inverter with an appropriate circuit diagram. Draw phase and line voltage waveforms on the assumption that each thyristor conducts for 180 degree and its resistive load is star connected. (8 + 8)

Or

(b) Discuss the principle of working of a 3 phase bridge inverter with each thyristor conducts for 120 degree and its load is delta connected (resistive). Draw phase and line voltage waveforms. (10 + 6)

13. (a) Explain the working of a six step inverter for which time interval is allowed between gating of thyristors. Obtain the line and phase voltage waveforms. What are the advantages of the circuit? (8 + 4 + 4)

Or

(b) Draw and explain the operation of a single phase ASCI. (16)

14. (a) Describe the working of a basic single phase series inverter with relevant circuit and waveforms. Derive an expression for the output frequency in terms of circuit parameters. (10 + 6)

Or

(b) (i) Compute the output frequency of a series inverter with the following parameters : Inductance $L = 6$ mH, Capacitance $C = 1.2$ microfarad, Load resistance $R = 100$ ohms and $T_{off} = 0.2$ ms. If the load resistance is varied from 49 to 140 ohms, find out the range of output frequency. (8)

(ii) Explain the high frequency time-sharing inverter with relevant circuit diagram and waveform. (8)

15. (a) Describe any two configurations of SMPS which can be employed one of low power applications and other for high power applications. (16)

Or

(b) Describe ZVS and ZCS resonant converter with necessary circuit diagram and wave form. (16)

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