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# Question Paper Code : 71631

M.E. DEGREE EXAMINATION, JUNE/JULY 2013.

First Semester

Power Electronics and Drives

PE 9213/PE 913/10233 PE 104 – ANALYSIS OF INVERTERS

(Common to M.E. Power Systems Engineering)

(Regulation 2009 / 2010)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. Compare Half Bridge and Full Bridge Inverters.

2. What are the types of voltage control methods in Inverters?

3. What is the ratio between third harmonic content to the fundamental in the line voltage of three phase Voltage Source Inverters?

4. Mention the advantages of Space Vector Modulation.

5. Why is converter grade SCRs is used in CSI?

6. Draw the equivalent circuit of single Phase ASCI for any one half cycle.

7. Give the different types of Multi level Inverters.

8. Mention the applications of multi level inverter.

9. What is the value of fundamental input voltage under quasi square wave control?

10. What is the need for modifications in series inverter?

PART B — (5 × 16 = 80 marks)

11. (a) The $1\varphi$ half bridge inverter has a resistive load of R = 2.4 Ω and the dc input voltage is $V_s$ = 48 V. Determine

(i) RMS O/P voltage at the fundamental frequency.

(ii) The output Power.

(iii) Average and Peak currents of each transistor.

(iv) The peaks reverse blocking voltage of each transistor. Derive the expression used.

Or

(b) Explain Modified McMurray Half Bridge Inverter with necessary circuit and waveforms.

12. (a) Explain the working principle of space vector modulation three phase Inverter with necessary waveforms and circuits.

Or

(b) A $3\varphi$ Bridge Inverter delivers power to a resistive load from a450 V dc source. For a star connected load of 10Ω/Phase, determine for both 180° and 120° mode operation.

(i) RMS value of load current

(ii) RMS value of thyristor current

(iii) Load power.

13. (a) A $1\varphi$ ASCI feed a resistive load. Describe its working with appropriate circuit and waveforms. Find also the circuit turn off time for the thyristors.

Or

(b) In a $1\varphi$ ASCI with inductive load SCRs $T_3$, $T_4$ are conducting a constant current =10 A. If $T_1$ and $T_2$ are turned on at t = 0 to force commutate $T_3$, $T_4$; find the time required for the load current to fall zero. Load L = 10 $\mu$H and commutating Capacitance C = 6 $\mu$F. Find also the total commutation interval and the circuit turn-off time for each of the SCRs.

14. (a) A $1\varphi$ diode clamped inverter has m = 5 Find the peak voltage and current ratings of diodes and switching devices if $V_{dc}$ = 5 KV and $i_0 = 50\sin(\theta - \Pi/3)$.

Or

(b) Explain the five level capacitor clamped Multilevel Inverter with necessary circuit and waveforms.

15. (a) Explain the principle of class E resonant inverter with neat diagram and its waveforms.

Or

(b) Explain the principle of $1\varphi$ parallel inverter with neat diagram and its waveforms.

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