Reg. No. : | | | | | | | | | | |

Question Paper Code: 52251

M.E. DEGREE EXAMINATION, JUNE 2016

Second Semester

Power Electronics and Drives

15PPE201 - ANALYSIS OF INVERTERS

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. For a bridge inverter

   (a) an output transformer is essential
   (b) an output transformer is not essential
   (c) an output transformer cannot be connected
   (d) an output transformer, if used, can improve the efficiency of the circuit

2. In a 3 phase bridge inverter with 120° mode of operation, the number of thyristors conducting at one time are

   (a) 1 (b) 2 (c) 3 (d) 4

3. A single phase CSI is connected to a capacitor load. For constant current source, the voltage across the capacitor is

   (a) square wave (b) triangular wave
   (c) sine wave (d) pulse wave

4. Transistor is used as a switch for developing

   (a) high power inverters (b) low power inverters
   (c) medium power inverters (d) low and medium power inverters

5. In resonant pulse inverters

(a) dc output voltage variation is wide
(b) the frequency is low
(c) output voltage is never sinusoidal
(d) dc saturation of transformer core is minimized

PART B - (5 x 3 = 15 Marks)

6. Why is IGBT preferred for inverters?

7. Why 180 degree conduction is more effective than 120 degree conduction?

8. Compare CSI and VSI.

9. What are the disadvantages of flying-capacitors multilevel inverter?

10. Why reverse conducting thyristor is preferred for series resonant inverter?

PART C - (5 x 16 = 80 Marks)

11. (a) Discuss the voltage control of single phase inverter using various PWM techniques. (16)

Or

(b) Explain various harmonics elimination methods in single phase inverter. (16)

12. (a) Explain in detail the space vector modulation for voltage control of three phase inverter. Draw the constriction of inverter space vector, space vector of 3 phase bridge inverter showing reference voltage trajectory voltage vectors and corresponding reference phase voltage wave. Tabulate the summary of inverter switching state and also plot the construction of symmetrical pulse pattern for three phases. (16)

Or

(b) Discuss the principle of working of a three phase voltage source inverter. Draw a phase and line voltage waveform on the assumptions that each thyristor conducts for 120 degree and the resistive load is delta connected. Derive expression for RMS value of line voltage phase voltage and fundamental phase voltage. (16)

13. (a) Explain the operation of six step current source inverter with inductive load. (16)

Or

(b) Describe elaborately the single phase auto sequential commutated CSI with relevant mode diagrams and waveforms. (16)

14. (a) Explain the operation of diode clamped and flying capacitor multilevel inverter with necessary details. Also discuss its features, advantages and disadvantages. (16)

Or

(b) Differentiate between the different configurations of multilevel inverters based on the various aspects involved in their design. (16)

15. (a) What are the methods used for voltage control of series resonant inverter? Explain any one method in detail. (16)

Or

(b) Describe the operation of resonant DC link inverters with zero voltage switching. Draw necessary circuits and waveforms. (16)

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