Register Number.....

M.E. DEGREE EXAMINATIONS: JANUARY - 2009

First Semester

POWER ELECTRONICS AND DRIVES

P07PE104: Analysis of Inverters

Time: Three Hours **Maximum Marks: 100**

Answer ALL Questions:-

PART-A (20 x 1 = 20 Marks)

1. The output voltage waveform of ideal inverter should be
   a. sinusoidal wave
   b. square wave
   c. quasi-square-wave
   d. triangular wave
2. A drawback of the half bridge inverter is it requires a
   a. 3 wire AC supply
   b. 3 wire DC supply
   c. 2wire AC supply
   d. 2 wire DC supply
3. PWM techniques are employed
   a. to control the harmonic content of the inverter
   b. to control the voltage of the inverter
   c. to control both the voltage and harmonic content of the inverter
   d. to eliminate only the lower order harmonics
4. The feedback diodes in a thyristor inverter
   a. freewheel the load current
   b. are effective in providing a negative bias to the thyristor for its turn off
   c. improve the harmonic distortion of the output current
   d. improve the switching frequency of the inverter
5. A voltage source inverter is normally employed
   a. when the source has a very low impedance
   b. when the source has a very high impedance
   c. when the load has a very small impedance
   d. source impedance have no-subject on the performance of the VSI
6. Short circuit of the source problem is possible in
   a. 180 degree conduction mode
   b. 120 degree conduction mode
   c. both 180 degree and 120 degree conduction modes
   d. neither 180 degree conduction mode nor 120 degree conduction mode

7. Utility factor of 180 degree conduction mode inverter is always
    a. less than 120 degree conduction mode
    b. more than 120 degree conduction mode
    c. zero
    d. one
8. Space vector modulation is a
    a. digital modulation technique
    b. analog domain technique
    c. WDM technique
    d. TDM technique
9. A current source inverter is normally employed
    a. if the source inductance is large
    b. if the source inductance is small
    c. on any source irrespective of its impedance
    d. if the load is pure inductive load
10. CSI has the ability to handle reactive or regenerative load
    a without freewheeling diodes
    b. with freewheeling diodes
    c with high dynamic response
    d. With low reactor.
11. In CSI, load communication is possible when
    a. load PF is leading
    b. load PF is lagging
    c. load PF unity
    d. load PF is zero
12. Current source inverters maybe
    a. either load commutated or force commutated.
    b. neither load commutated nor force commutated
    c. load commutated.
    d. force commutated.
13. A diode clamped multilevel inverter needs
    a. (m-1) DC bus capacitors.
    b. m DC bus capacitors.
    c. (m+1) DC bus capacitors
    d. (m-1)/2 DC bus capacitors
14. Multilevel inverters are suitable for
    a. low voltage and low current applications
    b. low voltage and high current applications.
    c. high voltage and low current applications.
    d. high voltage and high current applications.

15. Flying capacitor multilevel (m-level) inverter requires
    a. (m-1) X (m-2) / 2 balancing capacitors
    b. (m+1) X (m+2) / 2 balancing capacitors
    c. (m-1) X (m+2) / 2 balancing capacitors
    d. (m+1) X (m-2) / 2 balancing capacitors

16. A cascaded multilevel inverter consists of
    a. (m-1) X 2 main diodes
    b. (m+1) X 2 main diodes
    c. (m+1) / 2 main diodes
    d. (m-1) / 2 main diodes

17. The series resonant inverters are based on
    a. resonant current oscillation
    b. steady state operation
    c. continuous power flow operation
    d. discontinuous power flow operation.

18. The dead zone of a resonant inverter must be
    a. greater than the turn off time of thyristors
    b. smaller than the turn off time of thyristors
    c. equal to the turn off time of thyristors
    d. zero.

19. Class E resonant inverters are used primarily for
    a. low power and low frequency applications
    b. low power and high frequency applications
    c. high power and low frequency applications
    d. high power and high frequency applications

20. In resonant dc-link inverters, a resonant circuit is connected between the
    a. inverter and the dc supply
    b. inverter and the ac supply
    c. Inductor and the dc supply
    d. Inductor and the ac supply

PART-B (5 x 16 = 80 Marks)

21.(a) Explain the operation of single phase MC Murray inverter with the help of voltage and current waveform.

(OR)

21.(b) What are the techniques for harmonic reduction? Explain in detail.

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22.(a) Discuss the principle of working of a three phase bridge inverter with each thyristor conducts for 120 degree and its load is star connected (resistive).Draw phase and line voltage waveforms

(OR)

22.(b) Discuss the principle of working of a three phase bridge inverter with a circuit diagram. Draw phase and line voltage waveforms on the assumption that each thyristor conducts for 180 degree and its resistive load is delta connected

23.(a) Explain the operation of single phase auto sequential commutated inverter with RL load. Draw the associated voltage and current waveforms.

(OR)

23.(b) a.Write about the comparison between voltage source and current source inverters. (4)

b. Explain the operation of a six-step thyristor inverter with neat diagrams. (12)

24.(a) Explain the principle of operation of flying capacitor multilevel inverter.

(OR)

24.(b) What are the possible applications of multilevel inverters? Explain any one of them in detail.

25.(a) Explain the methods for voltage control of series resonant inverters.

(OR)

25.(b) Explain the operation of resonant DC-link inverter.

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