SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR

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QUESTION BANK (DESCRIPTIVE)

Subject with Code : APEC (16EE4302) **Course & Branch**: M.Tech - EEE
Year & Sem: I-M.Tech & I-Sem **Regulation:** R16

UNIT-I

SINGLE PHASE AND THREE PHASE AC VOLTAGE CONTROLLERS

1. a) List out the applications of AC voltage controllers   5M
    b) Explain the working operation of 1-ΦAC voltage controller with resistive load with output waveforms   5M
2. a) Explain the working operation of 1-Φ AC voltage controller with RL load with waveforms   5M
    b) Derive the expression for output voltage and output current of AC voltage controller with RL load   5M
3. a) Discuss the operation of AC voltage controller with PWM control   5M
    b) Write short notes on effect of source and load inductance of AC voltage controllers   5M
4. Explain the operation of synchronous tap changer with circuit diagram and necessary waveforms and its applications?   10M
5. A single phase AC voltage controllers with input voltage of 120V at 60HZ supply with a resistive load of 10Ω and delay is 60° calculate a) RMS out put voltage b) RMS output current
    c) RMS thyristor current d)Average thyristor current e) Input power factor   10M
6. a) Explain with neat circuit diagram and waveforms of the operation of Bi-directional AC voltage controller with star connected resistive load?   10M
7. Finding the performance parameters of a 3-Φ Bi-directional controller supplies a star connected resistive load of R=10Ω and a Line to Line input voltage 208V at 60HZ, if the delay angle α=$\pi/3$
    Determine a) RMS output phase voltage b) Input power factor c) Expressions for the instantaneous output voltages   10M
8. Explain the operation of 3-Φ Bi-directional AC voltage controller with delta connected resistive load with the help of circuit diagram and waveforms?   10M
9. Finding the performance parameters of a 3-Φ delta connected controller has R-load of R=10Ω and a Line to Line input voltage of 208V at 60HZ, if the delay angle α=$2\pi/3$ Determine

    a) RMS output phase voltage
    b) Expressions for the instantaneous currents
    c) RMS output phase current
    d) Input power factor
    e) RMS thyristor current

10. Discuss the effect of source and load inductances of 3-Φ AC voltage controllers   10M

UNIT-II

CYCLO CONVERTER AND SINGLE PHASE CONVERTERS

2. a) list out the applications of cyclo converters   5M

   b) list out the advantages and disadvantages of cyclo converters?   5M

2. Explain the working operation of 1φ to 1φ mid point cyclo converter with neat circuit diagram and necessary wave forms?   10M

3. Discuss the working operation of 1φ to 1φ bridge type cyclo converter with neat circuit diagram and necessary wave forms?   10M

4. Explain the operation of 3φ to 3φ cyclo converter with basic circuit and schematic arrangement?   10M

5. The input voltage to the bridge type cyclo converter is 120v, 60hz. The load resistance is 5Ω and the load inductance is 40mH. The frequency of the out put voltage is 20hz if the converter is operated as semi converter such that $0 \leq \alpha \leq \pi$ and the delay angle is $2\pi/3$, determine a) RMS out put voltage

          b) RMS value of each thyristor current

          c) Input power factor   10M

6. a) Explain the working operation of single phase half controlled converter with circuit diagram and waveforms?   5M

   b) Explain the operation of single phase fully controlled converter with necessary waveforms? 5M

7. a) Define i) input power factor   ii) harmonic factor   iii) distortion factor

   iv) Total harmonic distortion   4M

   b) Discuss the single phase dual converter with their advantages   6M

8. Explain the following power factor improvement techniques a) Extinction angle control

   b) Symmetrical angle control   c) PWM 1φ sinusoidal control   10M

9. a) write short notes on single phase series converter?   5M

   b) What are the applications of single phase converters?   5M

10. a) a single phase converter has RL load of R=0.5Ω, L=6.5 mH, the input voltage of 120v at 60 hz. Determine the load current at $\alpha = 60^0$ 5M

   b) A single phase dual converter is operated from a 120v at 60 hz supply. The load resistance is 10Ω and load inductance is 40 mH. The delay angle of the converter 1 is 60^0 and converter 2 is 120^0. Calculate the peak circulating current.   5M

UNIT-III
THREE PHASE CONVERTERS AND DC TO DC CONVERTERS

1. a) List out the advantages of 3-Φ converters over 1-Φ converters   5M
    b) What are the applications of 3-Φ converters   5M
2. a) Explain the operation of 3-Φ half controlled converter with freewheeling diode with suitable wave forms.   5M
    b) A 3-Φ half controlled converter is operated from a 3-Φ star connected 208V, 60HZ supply and the load inductance is 10Ω if it is required to obtain an average output voltage of 50% of the maximum possible of output voltage.   5M
3. Explain the operation of 3-Φ fully controlled converter with neat circuit diagram and wave forms. Derive the expression for output voltage of the converter?   10M
4. Explain the operation of 3-Φ dual converter with circuit diagram , waveforms and quadrant operation   10M
5. Discuss the following power factor improvement techniques
                       a)Three phase PWM converter   5M
                       b)Twelve pulse converter   5M
6. a) Explain the operation of step down DC-DC converter and derive expression for the output voltage   5M
    b) Explain the operation of step-up DC-DC converter and derive the expression for output voltage   5M
7. a) Explain the working operation of buck regulator with circuit diagram and wave forms   5M
    b) A buck regulator has an input voltage of 12V.the required average output voltage $V_0=5V$ and R=500Ω and peak to peak output voltage $V_o=5V$ and R=500Ω and peak to peak out put ripple voltage is 20nV. The switching frequency is 25Khz if the peak to peak ripple current of the inductor is limited to 0.8A determine (a) duty cycle (b) Filter inductor value (c) filter capacitive value   5M
8. a) Explain the operation of boost regulator with circuit diagram and waveforms   5M
    b) A boost regulator has an input voltage of 5V the average out put voltage is 15V and average load current is 0.5A the switching frequency is 25khz if L=150µH and C=220µF Determine (a) duty cycle (b) Filter inductor value and (c) filter capacitive value   5M
9. Write a short notes on
    a) Buck Boost Regulator   5M
    b) cuk regulator   5M
10. a) briefly discuss about multi output Boost converter   5M
    b) Application of DC – DC converter   5M

UNIT-IV
SINGLE PHASE PWM INVERTERS

1. Explain the principal of operation of single phase inverter with resistive load with the help of circuit diagram and wave forms   10M
2. Discuss the following performance parameters of 1-φ inverter
    a) Harmonic factor   2M
    b) Total harmonic distortion   3M
    c) Distortion factor   3M
    d) Lowest order harmonic   2M
3. The single phase half bridge inverter has a resistive load of R=2.4Ω and the DC input voltage V_s=48V Determine a) RMS out put voltage at fundamental frequency
                                    b) out put power
                                    c) average and peak current of each transistor
                                    d) THD   10M
 4. Explain the working operation of 1-φ bridge Inverter with circuit diagram and wave forms   10M
5. The bridge inverter has an RLC load with R=10Ω, L=30.5mH and C=0.2μF. Inverter frequency is
    f_0= 60Hz and DC input voltage is 220V calculate a) RMS load current
    b) THD   c) power absorbed by the load   10M
6. Briefly discuss about the voltage control of single phase inverter of
            a) Single pulse PWM control   3M
            b) Multi pulse PWM control   3M
            c) Sinusoidal PWM control   4M
7. Write short notes on
            a) Modified PWM control   5M
            b) Phase displacement Control   5M
8. Explain the following advanced modulation techniques   a) Trapezoidal   5M
                                                            b) Stair case   5M
9. Discuss about a) Stepped harmonic Injection   5M
                      b) Delta modulation   5M
10. a) List out the advantages of 1-φ inverters   5M
     b) What are the applications of 1-φ Inverters   5M

UNIT-V
THREE PHASE PWM INVERTERS

1. Explain the operation of 3-φ PWM inverter of 180 degree Conduction of out put voltage with resistive load   10M
2. Explain the operation of 3-φ PWM inverter of 120 degree Conduction of out put voltage with resistive load   10M
3. A 3-φ inverter has a star connected load of R=5Ω and L=20mH. The inverter frequency of f_o=60hz and a dc input voltage of V_s=220V determine
   a) RMS line voltage
   b) RMS phase voltage
   c) THD
   d) HF   10M
4. Explain the following voltage control technique of 3-Φ inverter
   a) Sinusoidal PWM control   5M
   b) Third harmonic PWM control   5M
5. Write short notes on
   a) 60 degree PWM control   5M
   b) Space vector modulation   5M
6. Compare PWM technique and space vector modulation   10M
7. Compare PWM technique and harmonic reduction current source inverter   10M
8. Write short notes on
   a) Variable dc link inverter   5M
   b) Boost inverter   5M
9. a) Explain the operation of Buck and Boost inverter with suitable diagrams   5M
   b) What are the steps taken for designing inverter circuit   5M
10. a) List out advantages and disadvantages of 3-Φ PWM inverter   5M
    b) What are the applications of 3-Φ PWM inverters   5M

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