Hall Ticket No | | | | | | | | | | | Question Paper Code: BPE005

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

M.Tech II Semester End Examinations (Regular) - July, 2017

Regulation: IARE–R16

DC TO AC CONVERTERS

(Power Electronics and Electrical Drives)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) Explain the principle of operation of a single phase full bridge inverter circuit with the help of a neat circuit diagram and necessary waveforms. **[7M]**

   (b) A single phase half bridge inverter is operated from a 48V battery and is supplying power to a pure resistive load of 2.4Ω. Determine **[7M]**

   i. The RMS voltage a fundamental frequency
   ii. Output power
   iii. Average and peak currents of each transistor

2. (a) Discuss any two methods of voltage control for single phase inverters. **[7M]**

   (b) Explain trapezoidal and staircase modulation techniques for single phase inverters. **[7M]**

UNIT – II

3. (a) What are resonant pulse inverters. Explain the principle of operation of series resonant inverters with unidirectional switches with a neat circuit diagram and waveforms. **[7M]**

   (b) The half-bridge resonant inverter is operated at an output frequency of 7 kHz. If $C_1 = C_2 = C = 3\mu F$ and $L_1 = L_2 = L = 50\mu H$, R = 2Ω and supply voltage Vs = 200V. Determine **[7M]**

   i. the peak supply current
   ii. average thyristor current
   iii. rms thyristor current

4. (a) Explain about voltage control of resonant inverters with a neat circuit diagram and waveforms. **[7M]**

   (b) Compare ZCS and ZVS resonant converters and state their limitations. **[7M]**

UNIT – III

5. (a) Draw a general topology of multilevel inverters. Explain the operation with a a typical output voltage waveform. **[7M]**

   (b) What are the various topologies of Multilevel inverters. Explain the advantage of each type. **[7M]**

6. (a) Explain the principle of operation of a cascaded Multilevel Inverter with a neat circuit diagram. **[7M]**

   (b) Consider the output phase voltage waveform for m= 6 (including 0-level) cascaded MLI, find the generalized Fourier series of the phase voltage waveform obtained. **[7M]**

UNIT – IV

7. (a) What are Switched-Mode DC power supplies. Explain the operation of a fly back converter with a neat circuit diagram. **[7M]**

   (b) Draw the Full-bridge converter and derive the expression for the voltage transfer ratio. **[7M]**

8. (a) Discuss about bidirectional power supplies and resonant DC power supplies. **[7M]**

   (b) Explain the operation of a push pull converter with the help of a neat circuit diagram. **[7M]**

UNIT – V

9. (a) Draw the schematic diagram of Switched-Mode AC power supplies and explain. **[7M]**

   (b) What are the types of power line disturbances. Explain about Power Conditioners with a neat diagram. **[7M]**

10. (a) Draw the block diagram of an UPS. Explain the function of each block. **[7M]**

    (b) Draw a circuit of a multistage conversion and explain. **[7M]**

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