



**SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR**  
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**QUESTION BANK (DESCRIPTIVE)**

**Subject with Code : MODERN POWER ELECTRONICS(16EE4310)**

**Course & Branch: M.Tech-PE Year & Sem: I-M.Tech & II-Sem**

**Regulation: R16**

**UNIT –I**

- 1(a) Explain the switching characteristics of MoS turnoff thyristor (MTO) with the help of its structure and equivalent circuit. [L2][5M]
- (b) What are the advantages and disadvantages of SITH and power integrated circuits (PIC). [L1][5M]
- 2(a) Draw and explain the basic structure of MOS controlled thyristor. [L3][5M]
- (b) Draw and explain various types of power integrated circuits. [L3][5M]
- 3.Explain in detail the operation of the device which has features of regenerative four layers thyristor and MOS gate structure with its equivalent circuit [L2][5M]
- 4.(a) What is main drawback of JTO? How this draw back can be overcome in MTO? [L2][5M]
- (b) Draw the symbol and equivalent circuit of MTO and explain its turn off process. [L3][5M]
- 5(a) Explain briefly about modern power semiconductor devices. [L1][5M]
- (b) Explain and draw its schematic equivalent circuit of Mos controlled thyristor (MCT). [L3][5M]
- 6(a) Draw and explain the basic structure of MOS controlled thyristor. [L3][5M]
- (b) Explain and draw its schematic equivalent circuit of Mos controlled thyristor (MCT). [L4][5M]
- 7(a) Explain the switching characteristics of MoS turnoff thyristor (MTO) with the help of its structure and equivalent circuit. [L2][5M]
- (b) What are the advantages and disadvantages of SITH. [L1][5M]
- 8(a) Draw the symbol and equivalent circuit of MTO and explain its turn off process. [L3][5M]
- (b) Explain and draw its schematic equivalent circuit of Mos controlled thyristor (MCT). [L3][5M]
- 9(a) Explain briefly about modern power semiconductor devices. [L1][5M]

(b) Explain and draw its schematic equivalent circuit of Mos controlled thyristor (MCT).[L3][5M]

10(a) Draw and explain various types of power integrated circuits [L3][5M]

(b) What are the advantages and disadvantages of SITH and power integrated circuits (PIC).

[L2][5M]

### UNIT -II

1(a).Explain the working of class E resonant rectifier with neat circuit diagram and necessary waveforms. [L2][5M]

(b)What are the advantages and limitations of class E resonant inverter? [L1][5M]

2(a) With necessary circuit and waveforms, explain the operation of class E-resonant inverter.

[L1][5M]

(b) Class E inverter operates at a resonance and has  $V_s=12V$  and  $R=10$  ohms.The switching frequency is  $f_s=25kHz$ .Determine the optimum values of (i)Inductor L (ii)Capacitor C

[L5][5M]

3.Explain the frequency resonance of series resonant inverter for a series load. [L3][10M]

4.A series resonant inverter with a series load delivers a load power of 1KW at a resonance. The load resistance is 10 ohms. The resonant frequency is 20 KHZ Determine (i) DC input voltage (ii) The quality factor Q, if it is required to reduce the load power to 250 W by frequency control so that  $u = 0.8$  (iii) The capacitor C? [L6][10M]

5.A series resonant inverter with a parallel load delivers a load power of 1KW at a peak sinusoidal voltage of  $V_p=330V$  and at a resonance. The load resistance is 10 ohms. The resonant frequency is 20 KHZ Determine (i) DC input voltage (ii) The frequency ratio  $u$  if it is required to reduce the load power to 250 W by frequency control (iii) The capacitor C? [L6][10M]

6(a) What are the disadvantages of PWM control and how they can be eliminated? [L3][5M]

(b) The ZCS resonant converter delivers a maximum power of 400mW at  $V_0=4V$ .The supply voltage is  $V_s=12 V$ .The maximum operating frequency is 50 kHz.Determine the values of Inductance Land Capacitance C [L5][5M]

7.Explain the operation of series inverter with uni-directional switches and bi-directional switches and compare both. [L4][10M]

8.A series resonant inverter with a series load delivers a load power of 1KW at a resonance. The load resistance is 20 ohms. The resonant frequency is 20 KHZ Determine (i) DC input voltage (ii) The quality factor Q, if it is required to reduce the load power to 250 W by frequency control so that  $u = 0.8$  (iii) The Inductor L (iv) The capacitor C?

9.A series resonant inverter with a parallel load delivers a load power of 1KW at a peak sinusoidal voltage of  $V_p=340V$  and at a resonance. The load resistance is 20 ohms. The resonant frequency is 20 KHZ Determine (i) DC input voltage (ii) The frequency ratio  $u$  if it is required to reduce the load power to 250 W by frequency control (iii) The Inductor L (iv) The capacitor C?

[L5][10M]

10 (a)With necessary circuit and waveforms, explain the operation of class E-resonant inverter

- (b) What are the advantages and limitations of class E resonant inverter [L2][5M]  
[L1][5M]

### UNIT-III

- 1(a) Explain the principle of operation of zero current switching resonant converters [L2][5M]  
(b) Compare L type ZCS with M type ZCS resonant converter and bring out few advantages and limitations of each [L3][5M]
2. Explain the basic principle of operation of M-type zero current switch (ZCS) resonant converter with relevant circuit and waveforms. [L2][10M]
3. Explain in detail the principle of ZVS converter with the help of circuit diagram and Waveforms [L2][10M]
- 4.(a) Explain the operation of push-pull converter with neat circuit diagram and necessary waveforms. [L3][5M]  
(b) Comparison between push-pull converter and fly back converter [L3][5M]
- 5(a) Explain the detailed operation of L-type ZCS resonant converter with neat circuit diagram. [L2][5M]  
(b) Difference between ZCS and ZVS resonant converters and advantages of ZCS Resonant converter. [L3][5M]
- 6(a) Describe the operation of improved diode clamped multilevel inverter. [L4][5M]  
(b) What are the main features of multilevel inverter and classification of multilevel inverter? [L2][5M]
- 7(a) With necessary circuit and waveforms, explain the operation of diode clamped multilevel Inverter [L2][5M]  
(b) With relevant circuit and waveforms, explain the operation of Flying capacitor multilevel inverter. [L3][5M]
- 8(a) Explain the principle of flying capacitor multilevel inverter. [L2][5M]  
(b) Mention the advantages of the flying capacitor multilevel inverter. [L3][5M]
- 9(a) Explain the principle of operation of diode clamped multilevel inverter [L3][5M]  
(b) Describe the advantages of diode clamped inverter [L4][5M]
10. Explain the principle of operation of cascaded multilevel inverter and its applications. [L3][10M]

### UNIT-IV

- 1(a) Explain the operation of bi-directional AC power supplies. [L2][5M]  
(b) Explain the multistage conversion in AC power supplies. [L2][5M]
- 2(a) With necessary circuit and waveforms, explain the operation of DC-DC converter with bipolar Voltage switching. Derive an expression for output voltage [L4][5M]  
(b) With relevant circuit, explain the operation of Push Pull DC power supply. [L5][5M]
- 3 (a) Write short notes on push-pull converter  
(b) Write short notes on bidirectional power supplies [L3][5M]
- 4(a) Explain about flyback converter. [L2][5M]  
(b) Write short notes on resonant DC power supply [L3][5M]
- 5(a) Explain the operation of on-line uninterruptible power supplies with circuit diagram [L1][5M]  
(b) What are the applications of uninterrupted power supplies? [L3][5M]
- 6(a) With the help of circuit, explain the operation of bidirectional AC power supply. [L4][5M]

- (b) What is the need of multistage conversion? Explain the operation of multistage conversion with the help of circuit. [L3][5M]
7. Explain about current mode control of AC power supply in detail [L2][5M]
8. Explain about voltage mode control of AC power supply in detail. [L2][5M]
- 9(a) Draw the circuit diagram for resonant AC power supply and explain. [L5][5M]
- (b) What are the general arrangements of UPS system and write the applications of AC power supplies? [L4][5M]
- 10 (a) Write short notes on resonant DC power supply [L1][5M]
- (b) Write short notes on bidirectional power supplies [L1][5M]

### UNIT-V

- 1(a) With the necessary block diagram, explain about UPS configuration where the load is normally connected to AC supply mains. [L1][5M]
- (b) Mention and explain the various types of line disturbances that are generally occurs. [L1][5M]
2. Explain in detail the terms: [L3][10M]
- (i) Power quality
- (ii) Power conditioner
3. With the help of a circuit diagram, explain uninterruptible power supply, and mention its Applications [L3][5M]
4. Write short notes on: [L2][10M]
- (a) Power conditioners
- (b) Integrated gate-commutated thyristor.
5. Write short notes on: [L2][10M]
- (a) DC link capacitor voltage balancing in multilevel inverter
- (b) Resonant power supplier
6. Explain in detail the terms [L2][10M]
- (a) Uninterruptible power supply
- (b) Power line Disturbances
- 7.(a) Classify the UPS and state any two applications of UPS. [L3][5M]
- (b) Explain about Off-line Interactive UPS in detail. [L2][5M]
- 8(a) Explain about Off-line preferred UPS in detail. [L2][5M]
- (b) What are the difference between SMPS and UPS. [L1][5M]
- 9(a) Mention the different types of disturbance in electrical power systems. [L2][5M]
- (b) Explain the working of OFF-Line standby UPS with block diagram [L2][5M]
- 10(a) Explain the working of online UPS with block diagram [L4][5M]
- (b) Write short notes on (i) Spike busters (ii) Spike suppressors [L2][5M]