GUJARAT TECHNOLOGICAL UNIVERSITY

BE 5 SEMESTER – OLD PAPER – S22 TO S26 – QUESTION BANK

Subject Name & Code: Power Electronics - 3151106

Chapter 1: Characteristics of Semiconductor Power Devices

Repeated Questions:

1. SCR – Structure, Characteristics and Ratings:

- **Q.** Explain the structure and symbol of SCR. / Explain the construction, operation and characteristics of SCR. [Diagram required – refer to the original question paper] **(SUMMER 2022, 7 Marks; SUMMER 2023, 3 Marks)**
- **Q.** Define and compare holding and latching currents of SCR. / Design VI characteristic of SCR. Show and explain the difference between holding current and latching current. [Diagram required – refer to the original question paper] **(SUMMER 2025, 4 Marks; WINTER 2025, 3 Marks)**
- **Q.** Explain two transistor analogy of SCR. / Discuss regenerative latching action in thyristor using two transistor analogy also derive equation for anode current. **(WINTER 2022, 7 Marks; WINTER 2025, 4 Marks OR)**
- **Q.** What are dv/dt and di/dt ratings of SCR? What happens if these rating exceeded? Explain. **(SUMMER 2024, 3 Marks; SUMMER 2026, 4 Marks)**
- **Q.** Make the comparison between SCR and TRIAC. **(WINTER 2025, 4 Marks)**
- **Q.** Describe dynamic Turn-ON switching characteristics of SCR. **(WINTER 2024, 4 Marks)**
- **Q.** Explain the basic requirements for the successful firing of SCR. **(SUMMER 2024, 3 Marks)**
- **Q.** Give classification of thyristors family. **(SUMMER 2022, 3 Marks)**

2. SCR Turn-On Methods and Triggering Circuits:

- **Q.** Explain the various Turn On methods of SCR. / Discuss firing or triggering of Thyristor in detail. [Diagram required – refer to the original question paper] **(WINTER 2022, 4 Marks; WINTER 2023, 7 Marks; SUMMER 2024, 4 Marks; SUMMER 2026, 3 Marks)**
- **Q.** Explain RC triggering circuit in detail / half-wave RC triggering / full-wave RC triggering / SCR resistance-capacitance triggering circuit. [Diagram required – refer to the original question paper] **(SUMMER 2025, 4 Marks; SUMMER 2025, 7 Marks; WINTER 2025, 4 Marks; SUMMER 2026, 7 Marks)**
- **Q.** With help of neat diagram and associated waveform, explain the operation of resistance triggering circuit / resistance firing circuit for SCR gate triggered. [Diagram required – refer to the original question paper] **(WINTER 2024, 4 Marks; SUMMER 2026, 4 Marks)**
- **Q.** Explain snubber circuit. / snubber circuits for thyristor / usage of snubber circuit. **(WINTER 2023, 3 Marks; WINTER 2025, 4 Marks; SUMMER 2026, 3 Marks)**

3. Commutation:

- **Q.** What is commutation? Explain self commutation. / self commutation by LC circuit / class-B self-commutation using LC circuit. [Diagram required – refer to the original question paper] **(WINTER 2022, 3 Marks; SUMMER 2023, 4 Marks; SUMMER 2025, 7 Marks; WINTER 2025, 3 Marks)**
- **Q.** What is commutation circuit for Thyristor? **(WINTER 2023, 3 Marks OR)**
- **Q.** What is commutation? Explain complementary commutation circuit. [Diagram required – refer to the original question paper] **(SUMMER 2026, 7 Marks)**
- **Q.** What is commutation? Explain class D forced commutation. [Diagram required – refer to the original question paper] **(SUMMER 2024, 4 Marks)**
- **Q.** Discuss design consideration of Class-C commutation circuit with circuit diagram, operation and waveform. [Diagram required – refer to the original question paper] **(WINTER 2024, 7 Marks)**

- **Q.** What is Commutation? Explain briefly the classification of commutation techniques. **(SUMMER 2022, 3 Marks OR)**

4. TRIAC, DIAC and UJT:

- **Q.** Explain the structure and characteristic of TRIAC. / structure and various triggering modes of TRIAC / V-I characteristics of TRIAC. [Diagram required – refer to the original question paper] **(SUMMER 2023, 3 Marks; WINTER 2023, 3 Marks; SUMMER 2024, 4 Marks; SUMMER 2026, 3 Marks)**
- **Q.** Draw and explain the circuit of ac phase control using DIAC and TRIAC. [Diagram required – refer to the original question paper] **(SUMMER 2022, 7 Marks OR; WINTER 2023, 7 Marks)**
- **Q.** Compare DIAC and TRIAC. **(SUMMER 2025, 4 Marks)**
- **Q.** Draw and Explain V-I characteristics of DIAC briefly. [Diagram required – refer to the original question paper] **(WINTER 2022, 3 Marks)**
- **Q.** Draw and explain the V-I characteristics of UJT. [Diagram required – refer to the original question paper] **(SUMMER 2022, 7 Marks; WINTER 2023, 7 Marks)**
- **Q.** Explain UJT as a relaxation oscillator. [Diagram required – refer to the original question paper] **(SUMMER 2022, 4 Marks OR; WINTER 2022, 3 Marks)**

5. Power MOSFET, IGBT, MCT and PIC:

- **Q.** Draw and explain the structure of power MOSFET. Explain principle and operation and V-I characteristics of power MOSFET. / What is power MOSFET? Explain its output characteristics. / Design the structure of MOSFET and explain its operation and V-I characteristics. [Diagram required – refer to the original question paper] **(WINTER 2022, 7 Marks; SUMMER 2023, 4 Marks; SUMMER 2024, 7 Marks OR; WINTER 2025, 7 Marks OR)**
- **Q.** Explain in brief about IGBT / basic structure of IGBT / basic structure and VI characteristic of IGBT / advantages of IGBT. [Diagram required – refer to the original question paper] **(SUMMER 2022, 4 Marks; SUMMER 2023, 3 Marks; WINTER 2023, 4 Marks; SUMMER 2025, 4 Marks OR; WINTER 2025, 7 Marks)**
- **Q.** Compare Power MOSFET and IGBT. / Compare IGBT and Power MOSFET. **(WINTER 2022, 4 Marks; SUMMER 2024, 4 Marks OR)**
- **Q.** Compare SCR and IGBT. **(SUMMER 2026, 4 Marks)**
- **Q.** Compare static and dynamic latch up in IGBT. **(SUMMER 2026, 4 Marks OR)**
- **Q.** What is MOS controlled thyristor (MCT)? Explain turn on process of N-MCT. / Design the basic structure of MCT and explain its turn on and turn off operations. / Explain MOS controlled thyristor. [Diagram required – refer to the original question paper] **(SUMMER 2023, 7 Marks; SUMMER 2024, 7 Marks; SUMMER 2025, 4 Marks)**
- **Q.** What is power integrated circuit (PIC)? / Explain the power integrated circuits. **(SUMMER 2023, 3 Marks OR; SUMMER 2025, 3 Marks)**
- **Q.** List different driver circuits for MOSFET and IGBT and explain one IC based driver circuit. [Diagram required – refer to the original question paper] **(WINTER 2023, 4 Marks OR)**

6. Freewheeling Diode:

- **Q.** Explain the effect of freewheeling diode. / effect of freewheeling diodes in power electronics circuits / usage of freewheeling diode in controlled rectifiers / Why a freewheeling diode is connected in inductive loaded circuit? / Justify: Freewheeling diode improves the power factor of the system. **(SUMMER 2022, 3 Marks OR; WINTER 2023, 4 Marks; WINTER 2024, 3 Marks; SUMMER 2025, 3 Marks OR; WINTER 2025, 3 Marks; SUMMER 2026, 3 Marks OR)**

7. Numerical Problems:

- **Q.** For Class-D commutation circuit, compute the value of the commutation capacitor C and commutation inductor L for the following data: E_{dc}= 50V, I_L(max)= 50A, t_{off} of SCR1= 30µs,

chopping frequency f= 500 Hz and the load voltage variation required is 10 to 100%. **(WINTER 2024, 7 Marks OR)**

- **Q.** A complementary commutation circuits operate from DC supply of 120 V and use $R_1 = R_2 = 10$ Ω, commutating capacitor C = 10 µF. Calculate circuit turn off time and peak thyristor current. **(SUMMER 2025, 7 Marks)**
- **Q.** The latching current of a thyristor circuit is 50mA. The duration of the firing pulse is 50µs. Will the thyristor get fired? Here R= 50 Ω, L= 0.5 H and V= 100V. **(WINTER 2024, 3 Marks)**
- **Q.** A 200 A SCR is to be connected in parallel with 300 A SCR. The on state voltage drops of the SCRs are 2.1 V and 1.75 V respectively. Calculate the series resistance that should be connected with each SCR if the two SCRs have to share the total current 500 A in proportion to their ratings. **(SUMMER 2022, 4 Marks)**

Other Important Questions:

1. SCR Terms:

- **Q.** Define the following terms in connection with SCR: [Data truncated in source – refer to the original question paper] **(WINTER 2024, 3 Marks)**

Chapter 2: Controlled Rectifiers

Repeated Questions:

1. Single Phase Controlled Converters:

- **Q.** Explain the operation of single phase fully controlled bridge converter with resistive and inductive load / RL load / RLE load with associated waveforms. / Discuss Rectifying mode and Inverting mode of fully controlled bridge rectifier circuit with Inductive load. [Diagram required – refer to the original question paper] **(WINTER 2022, 7 Marks; SUMMER 2023, 7 Marks OR; WINTER 2023, 7 Marks OR; WINTER 2024, 7 Marks; SUMMER 2025, 7 Marks OR; SUMMER 2026, 7 Marks OR)**
- **Q.** Explain the operation of single phase semi controlled bridge converter with resistive and inductive load. Draw associated waveforms. / Draw Circuit diagram and waveforms of single-phase half-controlled bridge rectifier for firing angle α = 90°. / Explain Semiconverter. Draw two Semiconverter circuits. [Diagram required – refer to the original question paper] **(WINTER 2024, 3 Marks OR; WINTER 2024, 4 Marks; WINTER 2025, 7 Marks)**

2. Performance Parameters:

- **Q.** Derive input supply power factor, displacement factor and harmonic factor for single phase full wave-controlled rectifier using its input current Fourier series analysis. / Explain displacement factor and harmonic factor of rectifiers. **(WINTER 2022, 7 Marks OR; WINTER 2023, 4 Marks OR)**

Other Important Questions:

1. Half Wave, Three Phase and Comparison:

- **Q.** Explain the working of half wave-controlled rectifier with resistive load. [Diagram required – refer to the original question paper] **(SUMMER 2023, 7 Marks)**
- **Q.** Derive the average load voltage and load current equations of single phase half wave controlled rectifier with resistive and inductive load. **(SUMMER 2024, 7 Marks)**
- **Q.** Explain single phase half wave controlled rectifier with RL load with proper waveforms. [Diagram required – refer to the original question paper] **(SUMMER 2022, 7 Marks OR)**
- **Q.** Draw and explain Three Phase Half wave controlled rectifier with required waveforms and equations. [Diagram required – refer to the original question paper] **(SUMMER 2022, 7 Marks)**
- **Q.** Compare simple rectifier and controlled rectifier. **(SUMMER 2025, 3 Marks)**

2. Numerical Problems:

- **Q.** A single phase semi converter is operated from 120 V, 60 Hz ac supply. The load resistance is 10 Ω, if the average output voltage is 25% of the maximum possible average output voltage, find: 1. Delay angle 2. Average and rms output voltage 3. Average and rms thyristor current. **(SUMMER 2026, 7 Marks)**
- **Q.** The half wave controlled rectifier has purely resistive load of R and delay angle α = 60° determine. (i) Rectification efficiency (ii) Form factor and (iii) Ripple factor. **(SUMMER 2024, 7 Marks)**
- **Q.** A single phase half wave controlled rectifier is operated from a 240 V, 50 Hz. Load resistance R = 20 Ω. If the average output voltage is 25% of the maximum possible average output voltage, determine: (1) the firing angle (2) rms and average output and SCR currents. **(WINTER 2025, 7 Marks)**
- **Q.** A single phase full converter is supplied from 230 V, 50 Hz supply. The load current is continuous and ripples free. If the average current is 150 A and source inductance is 0.1 mH determine the overlap angle at (i) α = 10° (ii) α = 30° (iii) α = 60°. **(SUMMER 2025, 7 Marks OR)**

Chapter 3: Choppers

Repeated Questions:

1. Step-down and Step-up Chopper:

- **Q.** What is the function of Chopper? Explain the working of step down chopper. / Draw the circuit diagram and explain the operation of step down chopper with the help of waveforms. / Explain Step down Chopper briefly. [Diagram required – refer to the original question paper] **(SUMMER 2022, 3 Marks; WINTER 2022, 4 Marks; WINTER 2023, 3 Marks; SUMMER 2026, 3 Marks)**
- **Q.** What is the function of Chopper? Explain the working of step-up chopper. / What is step-up chopper? Explain in brief. / Explain Step up Chopper briefly. / Draw the schematic of step-up chopper and derive an expression for output voltage of chopper. [Diagram required – refer to the original question paper] **(WINTER 2022, 3 Marks OR; SUMMER 2023, 4 Marks OR; SUMMER 2024, 3 Marks; WINTER 2025, 3 Marks)**

2. Chopper Classes:

- **Q.** With help of circuit diagram explain the working of class D chopper. / What are the applications of chopper? Explain the working of class D chopper. [Diagram required – refer to the original question paper] **(WINTER 2025, 3 Marks OR; SUMMER 2026, 4 Marks)**
- **Q.** With help of circuit diagram explain the working of class B chopper. / Draw the circuit of Type B chopper and explain its operation with waveforms. [Diagram required – refer to the original question paper] **(SUMMER 2023, 7 Marks OR; SUMMER 2026, 4 Marks OR)**

3. Multiphase Chopper and Control Strategies:

- **Q.** Explain the multiphase choppers. / Enlist advantages and disadvantages of multiphase chopper? **(WINTER 2023, 4 Marks; SUMMER 2024, 4 Marks OR; SUMMER 2026, 3 Marks OR)**
- **Q.** Explain the different control strategies for chopper. / Explain any one time ratio control (TRC) strategy for chopper operation. / With help of waveform explain the current limit control strategy of chopper. / Compare the Time Ratio control and current limit control strategies of chopper. / What is Pulse Width Modulation? How can it be used to control the output of chopper? [Diagram required – refer to the original question paper] **(SUMMER 2022, 4 Marks OR; WINTER 2022, 7 Marks; SUMMER 2023, 4 Marks; WINTER 2023, 7 Marks OR; SUMMER 2024, 4 Marks; WINTER 2025, 4 Marks)**

Other Important Questions:

1. Chopper Fundamentals, Classes and Comparison:

- **Q.** With help of circuit diagram explain the working of class E chopper. [Diagram required – refer to the original question paper] **(SUMMER 2025, 4 Marks)**
- **Q.** What are the applications of chopper? Explain the working of class A chopper. [Diagram required – refer to the original question paper] **(SUMMER 2024, 3 Marks OR)**
- **Q.** What is DC chopper? Explain the principle of chopper operation. **(SUMMER 2023, 7 Marks)**
- **Q.** Write the classification of DC Chopper. **(SUMMER 2025, 3 Marks)**
- **Q.** Compare class B and class C Chopper. **(WINTER 2023, 4 Marks)**
- **Q.** Enumerate the merits and demerits of load commutated chopper. **(SUMMER 2025, 3 Marks OR)**
- **Q.** With help of circuit diagram explain the working of Jones chopper. [Diagram required – refer to the original question paper] **(SUMMER 2025, 4 Marks OR)**
- **Q.** Differentiate between one quadrant and two quadrant converter. **(SUMMER 2023, 3 Marks)**
- **Q.** Compare the step up and step down chopper. **(WINTER 2025, 4 Marks OR)**
- **Q.** Explain step-down converter with RL load in details. [Diagram required – refer to the original question paper] **(WINTER 2024, 7 Marks)**

- **Q.** Justify this statement for step-up operation: The conditions for controllable power transfer are $0 < V_S < E$. **(WINTER 2024, 4 Marks)**
- **Q.** List applications of DC-DC converter. **(WINTER 2024, 3 Marks)**
- **Q.** Differentiate between constant frequency and variable frequency operation of chopper. **(WINTER 2022, 4 Marks OR)**

2. Numerical Problems:

- **Q.** A DC type A chopper has resistive load 20 Ω and input voltage of 220 volts. When the chopper remains on, its voltage drop is V_{ch} = 1.5 volts and chopping frequency is 10 kHz, if duty cycle is 80% determine: 1. Average output voltage 2. RMS output voltage 3. Chopper efficiency 4. Effective input resistance. **(SUMMER 2026, 7 Marks OR)**
- **Q.** A dc chopper circuit connected to 100 V dc source supplies an inductive load having 50 mH in series with resistance of 5 Ω. Freewheeling diodes is placed across the load. The load current varies between the limits of 10-12 A. Determine the time ratio of the chopper. **(WINTER 2025, 7 Marks OR)**
- **Q.** A chopper circuit is operating on time ratio control (TRC) principle at a frequency of 2 kHz on a 220 V DC supply. If load voltage is 170 V, compute the conduction and blocking period of thyristor in each cycle. **(SUMMER 2023)**
- **Q.** A dc chopper operates on 300V dc and frequency of 200 Hz, feeds an R-L load. Determine the ON times of the chopper for output voltage of 150V. **(SUMMER 2024, 7 Marks OR)**
- **Q.** A step up chopper has input voltage of 220V and output voltage of 660V. If the nonconducting time of thyristor chopper is 100 µsec, compute the pulse width of output voltage. In case pulse width is halved for constant frequency operation, find the new output voltage. **(WINTER 2022, 7 Marks OR)**
- **Q.** The DC-DC converter has a resistive load of R= 10 Ω and the input voltage is V_s=220V. When the converter switch remains on, its voltage drop is V_{ch}= 2V and the chopping frequency is f= 1 KHz. If the duty cycle is 50%, determine (a) the average output voltage V_a, (b) the rms output voltage V_o, (c) the converter efficiency. **(WINTER 2024, 4 Marks OR)**

Chapter 4: Single-phase Inverters

Repeated Questions:

1. Inverter Circuits:

- **Q.** What is inverter? Explain the operation of single-phase full bridge inverter. / With the help of circuit diagram and waveforms, explain the working of single phase full bridge inverter. / Explain single phase full bridge Inverter in details. / Explain bridge square wave inverter with necessary diagrams. / With help of neat circuit diagram and waveforms, explain the operation of single phase full bridge square wave inverter with resistive load. [Diagram required – refer to the original question paper] **(WINTER 2022, 7 Marks OR; SUMMER 2023, 7 Marks; WINTER 2023, 7 Marks OR; SUMMER 2024, 7 Marks OR; WINTER 2024, 7 Marks OR)**
- **Q.** With help of neat circuit diagram and waveforms, explain the operation of PWM full bridge inverter with resistive load. / With help of neat circuit diagram and waveforms, explain the operation of PWM inverter with resistive load. [Diagram required – refer to the original question paper] **(WINTER 2022, 7 Marks; SUMMER 2026, 7 Marks)**
- **Q.** With help of neat circuit diagram and waveforms, explain the operation of PWM half bridge inverter with resistive load. / With help of neat circuit diagram and waveforms, explain the operation of single phase half bridge voltage source inverter with resistive load. [Diagram required – refer to the original question paper] **(SUMMER 2024, 7 Marks; WINTER 2025, 7 Marks)**
- **Q.** With help of neat circuit diagram and waveforms, explain the operation of single phase current source inverter. / Design and explain the operation of current source inverter. / Explain the working of single phase current source inverter with resistive load. [Diagram required – refer to the original question paper] **(WINTER 2022, 3 Marks; SUMMER 2023, 7 Marks OR; WINTER 2023, 3 Marks OR; WINTER 2025, 7 Marks OR; SUMMER 2026, 7 Marks OR)**

2. Comparison and Applications of Inverters:

- **Q.** Compare voltage and current source inverter. / Give comparison between Voltage source Inverter and Current source Inverter. **(WINTER 2022, 3 Marks OR; WINTER 2024, 3 Marks OR)**
- **Q.** What is the function of an inverter? List out various applications of an inverter. / Enlist the applications of Inverter. / What are the applications of an inverter? **(WINTER 2022, 4 Marks OR; WINTER 2023, 4 Marks; WINTER 2025, 3 Marks OR)**

Other Important Questions:

1. Inverter Theory:

- **Q.** Explain the various voltage control methods of single phase inverter. **(SUMMER 2025, 7 Marks)**
- **Q.** With help of neat circuit diagram and waveforms, explain the operation of single phase voltage source inverter. [Diagram required – refer to the original question paper] **(SUMMER 2025, 7 Marks OR)**
- **Q.** Give the classification of inverters. **(SUMMER 2022, 3 Marks)**
- **Q.** What are the drawbacks of square wave inverter? **(SUMMER 2023, 3 Marks OR)**
- **Q.** List the advantages and disadvantages of pulse width modulated (PWM) inverters. **(SUMMER 2023, 3 Marks)**
- **Q.** Explain the internal control pulse width modulation control method of inverter. **(SUMMER 2024, 3 Marks OR)**
- **Q.** Discuss following performance parameter of Inverters: (1) Harmonic Factor of nth harmonics (2) Total harmonic distortion (3) Distortion Factor (4) Lowest order Harmonics. **(WINTER 2024, 4 Marks OR)**

2. Numerical Problems:

- **Q.** The single-phase half-bridged inverter has a resistive load of R= 2.4 Ω and the dc input voltage is V_s= 48V. Determine (a) the rms output voltage at the fundamental frequency V_{o1}, (b) the output

power P_o, (c) the average and peak currents of each transistors, (d) the peak reverse blocking voltage V_{BR} of each transistor, (e) the THD, (f) the DF and (g) the HF and DF of the LOH. **(WINTER 2024, 7 Marks OR)**

Chapter 5: Switching Power Supplies

Repeated Questions:

1. Flyback Converter:

- **Q.** Explain the working of fly back converter SMPS. / Explain the operation of flyback converter (SMPS) with circuit diagram and waveform. / Explain the construction and working of flyback converter type switched mode DC power supply. / With the help of circuit diagram and relevant waveforms, explain the operation of continuous mode Flyback Converter. Also derive expression for voltage transfer ratio in terms of transformer turns ratio and duty cycle. / Explain the discontinuous mode of isolated fly back SMPS. [Diagram required – refer to the original question paper] **(WINTER 2022, 7 Marks OR; SUMMER 2023, 7 Marks; WINTER 2023, 7 Marks OR; SUMMER 2024, 4 Marks; WINTER 2024, 7 Marks; SUMMER 2025, 3 Marks; WINTER 2025, 4 Marks; SUMMER 2026, 4 Marks)**

2. SMPS Fundamentals:

- **Q.** What are the advantages of SMPS over normal power supply? List out the various applications of SMPS. / Compare Power supply and SMPS. / Compare General Power supply and SMPS. / What is SMPS? Give the classification of SMPS. Also List out advantages and disadvantages of SMPS. / Explain block diagram of SMPS. [Diagram required – refer to the original question paper] **(SUMMER 2022, 7 Marks; SUMMER 2022, 3 Marks; WINTER 2022, 4 Marks; SUMMER 2024, 3 Marks; WINTER 2025, 3 Marks; SUMMER 2026, 3 Marks)**

3. Resonant Converters:

- **Q.** What is resonant converter? Explain the working of series resonant inverter with unidirectional switch. / What is soft switching? Enlist the types of soft switching. / With the help of neat circuit diagram and associated waveform, explain the operation of Zero voltage switching resonant converters in half-wave mode. [Diagram required – refer to the original question paper] **(SUMMER 2023, 7 Marks OR; WINTER 2023, 4 Marks OR; WINTER 2024, 7 Marks)**

Other Important Questions:

1. Flyback Converter Design:

- **Q.** Discuss the selection criteria for switching transistor of flyback converter. **(WINTER 2024, 3 Marks)**

Chapter 6: Applications

Repeated Questions:

1. UPS:

- **Q.** With help of block diagram explain the operation of off line uninterrupted power supply. Write the detail specifications of off line UPS. / Write short note on UPS. / Explain the block diagram of online UPS system. / With help of block diagram, explain the operation of on line UPS. List the important specifications of on line UPS. / Compare online and offline UPS. / Draw the block diagram of UPS. / Write a short note on online UPS system. [Diagram required – refer to the original question paper] **(SUMMER 2022, 4 Marks; SUMMER 2022, 7 Marks OR; WINTER 2022, 3 Marks; SUMMER 2023, 4 Marks; WINTER 2023, 3 Marks; WINTER 2023, 3 Marks; SUMMER 2024, 7 Marks; WINTER 2024, 7 Marks OR; SUMMER 2025, 7 Marks; WINTER 2025, 7 Marks; SUMMER 2026, 7 Marks)**
- **Q.** How to calculate capacity and efficiency of UPS battery? / Explain the capacity and efficiency of batteries used in UPS. **(SUMMER 2023, 4 Marks OR; SUMMER 2025, 4 Marks OR)**

2. Power Line Disturbances, Power Conditioners and EMI/EMC:

- **Q.** Define and explain power line disturbances. / Discuss Power line disturbances. **(WINTER 2024, 4 Marks OR; SUMMER 2026, 3 Marks OR)**
- **Q.** Explain the design and application of power conditioner. / List application of various Power conditioners. **(WINTER 2024, 3 Marks OR; SUMMER 2026, 4 Marks OR)**
- **Q.** Compare EMI and EMC. / What do you mean by EMI and EMC? / Discuss EMI protection in brief. / What is meant by EMI and EMC? **(WINTER 2022, 4 Marks OR; SUMMER 2024, 3 Marks OR; SUMMER 2025, 3 Marks OR; WINTER 2025, 3 Marks OR)**

3. Motor Drives:

- **Q.** Explain the construction, working and applications of permanent magnet stepper motor drive. / Write short note on P M Stepper Motor drives. / Write short note on permanent magnet stepper motor drive. **(SUMMER 2024, 7 Marks OR; WINTER 2025, 7 Marks OR; SUMMER 2026, 7 Marks OR)**
- **Q.** Explain the working of DC chopper drive. / Explain the chopper circuit used to drive DC series motor. / Enlist advantages of DC chopper drive. [Diagram required – refer to the original question paper] **(SUMMER 2023, 3 Marks OR; WINTER 2023, 3 Marks OR; WINTER 2025, 4 Marks OR)**
- **Q.** Explain the single-phase, half-wave converter for controlling separately excited DC motor. / Explain the construction, working and applications of separately excited DC motor drive. **(SUMMER 2023, 4 Marks OR; SUMMER 2025, 7 Marks OR)**
- **Q.** Explain speed control of AC motor. / Explain the working of induction motor. / Explain Speed control of Motor. / List speed control methods of Induction motor. Explain closed-loop speed control. **(SUMMER 2022, 7 Marks; WINTER 2022, 4 Marks; WINTER 2023, 7 Marks; SUMMER 2024, 4 Marks OR; WINTER 2024, 4 Marks)**
- **Q.** Gives comparison between DC and AC Drives. / Enlist advantages of AC drives. **(SUMMER 2022, 4 Marks OR; WINTER 2022, 3 Marks OR)**

Other Important Questions:

1. DC Drives:

- **Q.** Draw and explain Phase Locked Loop Control of DC Drives. [Diagram required – refer to the original question paper] **(SUMMER 2022, 3 Marks)**
- **Q.** Explain regenerative and dynamic braking of dc motor. **(SUMMER 2022, 4 Marks)**

Uncategorised Questions

Repeated Questions:

1. Dielectric Heating:

- **Q.** Explain the principle of Dielectric Heating. Also gives application of Dielectric Heating. **(SUMMER 2022, 7 Marks OR; WINTER 2023, 7 Marks)**

Other Important Questions:

1. AC Chopper and Induction Heating:

- **Q.** Explain single phase AC chopper with necessary diagram. [Diagram required – refer to the original question paper] **(SUMMER 2022, 4 Marks)**
- **Q.** Write down the basic principle of induction heating. **(SUMMER 2022, 3 Marks OR)**

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