GUJARAT TECHNOLOGICAL UNIVERSITY

DI -5 SEMESTER – OLD PAPER – W23 TO S25 – QUESTION BANK(English)

Subject Name & Code:

Power Electronics & Drives- 4350902

Unit I - Power Electronic Devices

Repeated Questions:

1. **Explain construction, working and characteristic of IGBT.**
    - Appeared in: SUM 24 (Q1c(OR), 07 marks), WIN 24 (Q1c, 07 marks), WIN 23 (Q4c, 07 marks)
2. **Explain construction, working and characteristic of SCR.**
    - Appeared in: WIN 23 (Q4c(OR), 07 marks), SUM 25 (Q1c(OR), 07 marks)
3. **Explain the comparison between Natural Commutation and Forced Commutation.**
    - Appeared in: WIN 23 (Q1b, 04 marks), SUM 25 (Q1b, 04 marks)
4. **Compare Polyphase rectifier and single-phase rectifier. / State Advantages of Polyphase Rectifier over single phase Rectifier.**
    - Appeared in: WIN 24 (Q1a, 03 marks), SUM 24 (Q1a, 03 marks), WIN 23 (Q3a(OR), 03 marks), SUM 25 (Q2a(OR), 03 marks)
5. **Draw the symbol of GTO, IGBT, and MCT. / Give full form and draw symbol of (i) MCT (ii) IGBT (iii) LASCR. / Draw the symbol of 1. MCT 2. Triac 3.UJT.**
    - Appeared in: WIN 23 (Q1a, 03 marks), SUM 25 (Q1a, 03 marks), SUM 24 (Q4a, 03 marks)

Other Important Questions:

1. **Define holding current, latching current. State the different methods of mounting of SCR. Explain any two.**
    - Appeared in: WIN 23 (Q1c, 07 marks)
2. **What is the commutation of SCR? Explain class F commutation.**
    - Appeared in: WIN 23 (Q1c(OR), 07 marks)
3. **Explain construction, working and characteristic of power diode.**
    - Appeared in: SUM 25 (Q1c, 07 marks), SUM 24 (Q1c, 07 marks)
4. **State different types of protection of SCR. Describe the snubber circuit with circuit diagram.**

- Appeared in: SUM 25 (Q1c(OR), 07 marks)

5. **Explain the need of heat sink for SCR. / State need of heat sink in SCR.**
   - Appeared in: SUM 25 (Q2a, 03 marks), SUM 24 (Q4a(OR), 03 marks)
6. **Explain class-C commutation of SCR with circuit and waveforms.**
   - Appeared in: SUM 25 (Q2b, 04 marks)
7. **Explain triggering control of SCR using UJT.**
   - Appeared in: SUM 25 (Q2b(OR), 04 marks)
8. **Write Need of commutation of SCR. Draw the waveform and explain the turn off characteristics of SCR.**
   - Appeared in: WIN 24 (Q1c(OR), 07 marks)
9. **Explain Amplitude control method for the firing angle control of SCR.**
   - Appeared in: WIN 23 (Q4b, 04 marks), WIN 24 (Q2b, 04 marks)
10. **Explain phase shift control method for the firing angle control of SCR.**
    - Appeared in: WIN 23 (Q4b(OR), 04 marks)
11. **State types of SCR protection and explain snubber circuit for protection of SCR.**
    - Appeared in: SUM 24 (Q4c(OR), 07 marks)
12. **What is meant by snubber circuit? What is its use? Explain in brief.**
    - Appeared in: WIN 24 (Q4b, 04 marks)
13. **State the name of various types of commutation and explain class C commutation.**
    - Appeared in: SUM 24 (Q4c, 07 marks)
14. **Explain class A commutation in brief.**
    - Appeared in: SUM 24 (Q4b(OR), 04 marks)
15. **Explain need of freewheeling diode in brief.**
    - Appeared in: SUM 24 (Q4b, 04 marks)

Unit II - Single phase and three phase uncontrolled and controlled rectifiers and regulators.

Repeated Questions:

1. **Explain three phase half wave rectifier with necessary waveforms and features.**
    - Appeared in: WIN 23 (Q3c, 07 marks), WIN 24 (Q3c, 07 marks)
2. **Explain three phase full wave rectifier / bridge rectifier with necessary waveforms and features.**
    - Appeared in: WIN 23 (Q3c(OR), 07 marks), WIN 24 (Q2a, 03 marks), SUM 25 (Q2c, 07 marks)
3. **Explain single phase full wave midpoint-controlled rectifier with waveform.**
    - Appeared in: SUM 25 (Q2c(OR), 07 marks), SUM 24 (Q2b, 04 marks)
4. **Explain single phase half wave-controlled rectifier with waveform.**
    - Appeared in: SUM 24 (Q2b(OR), 04 marks)
5. **Explain AC load control using two SCRs and Two diodes. / Explain AC load control using Triac and Diac.**
    - Appeared in: SUM 25 (Q3a(OR), 03 marks), SUM 25 (Q2a(OR), 03 marks), WIN 23 (Q3a, 03 marks)

Other Important Questions:

1. **Explain three phase uncontrolled full wave bridge rectifier with waveform.**
    - Appeared in: SUM 24 (Q2c(OR), 07 marks)
2. **Derive Edc, Idc, Erms, Irms for three phase half wave uncontrolled rectifier.**
    - Appeared in: SUM 24 (Q2c, 07 marks)
3. **Explain effect of transformer reactance in brief.**
    - Appeared in: SUM 24 (Q2a, 03 marks)
4. **Explain control of A.C. load using Triac and Diac.**
    - Appeared in: WIN 23 (Q3a, 03 marks)
5. **Write Advantages of Polyphase Rectifier over single phase Rectifier.**
    - Appeared in: WIN 23 (Q3a(OR), 03 marks)
6. **What are harmonics? State causes and effect of harmonics.**
    - Appeared in: WIN 24 (Q3a(OR), 03 marks), SUM 24 (Q3a(OR), 03 marks)

Unit III - Inverters, Choppers.

Repeated Questions:

1. **Explain classification of inverters.**
   - Appeared in: WIN 23 (Q2b, 04 marks), WIN 24 (Q2b, 04 marks)
2. **Explain Jones Chopper. / Write a short note on Jones chopper.**
   - Appeared in: WIN 23 (Q2a, 03 marks), SUM 24 (Q3b, 04 marks)
3. **Explain Class A chopper with drawing necessary waveforms.**
   - Appeared in: WIN 23 (Q3b, 04 marks), SUM 25 (Q3b, 04 marks)
4. **Explain Class B chopper with drawing necessary waveforms.**
   - Appeared in: WIN 23 (Q3b(OR), 04 marks)
5. **Explain Class C chopper with circuit and waveforms. / Explain Class C chopper in brief.**
   - Appeared in: WIN 24 (Q2c, 07 marks), SUM 24 (Q3b(OR), 04 marks)
6. **Write a short note on types of pulse width modulation (PWM) control of inverter.**
   - Appeared in: SUM 24 (Q3c(OR), 07 marks), WIN 24 (Q4c, 04 marks)

Other Important Questions:

1. **Explain Morgan Chopper. / Draw and Explain Morgan Chopper.**
   - Appeared in: WIN 23 (Q2a(OR), 03 marks), WIN 24 (Q2a(OR), 03 marks)
2. **Explain different methods of PWM (pulse width modulation) control for the voltage control of inverters.**
   - Appeared in: WIN 23 (Q2c, 07 marks)
3. **Explain Single phase bridge inverter in detail. / Explain single phase full bridge inverter with circuit and waveforms.**
   - Appeared in: WIN 23 (Q2c(OR), 07 marks), SUM 25 (Q3c(OR), 07 marks)
4. **Explain single phase series inverter with its waveform. / Explain single phase series inverter.**
   - Appeared in: SUM 25 (Q3b(OR), 04 marks), WIN 24 (Q3a, 03 marks), SUM 24 (Q3a, 03 marks)
5. **Explain step up chopper in brief. / Write Short note on Step up chopper.**
   - Appeared in: SUM 24 (Q1b, 04 marks), WIN 24 (Q3b, 04 marks)
6. **Draw and explain circuit for speed control of slip-ring induction motor using chopper.**
   - Appeared in: WIN 23 (Q2b(OR), 04 marks)
7. **Explain three level capacitor clamped multilevel inverter.**
   - Appeared in: SUM 24 (Q3c, 07 marks)
8. **Draw Pulse control using RC circuit and UJT half wave circuit. Explain its working.**
   - Appeared in: WIN 24 (Q2c(OR), 07 marks)

Unit IV - Electronic drives and Control.

Repeated Questions:

1. **Explain speed control of dc motor by armature voltage control.**
    - Appeared in: WIN 23 (Q4a(OR), 03 marks)
2. **Explain speed control of dc drive using PLL method.**
    - Appeared in: WIN 23 (Q4a, 03 marks)
3. **Draw and explain block diagram of AC drive in brief.**
    - Appeared in: SUM 24 (Q5a, 03 marks), WIN 24 (Q5a, 03 marks)
4. **Explain speed control of 3-phase induction motor by varying the stator voltage. / Explain speed control of three phase induction motor using chopper.**
    - Appeared in: WIN 23 (Q5b, 04 marks), SUM 24 (Q5b, 04 marks)
5. **Explain closed loop control of d.c. drive.**
    - Appeared in: WIN 23 (Q5a(OR), 03 marks)
6. **Explain speed control of the universal motor by open loop control method.**
    - Appeared in: WIN 23 (Q5b(OR), 04 marks)

Other Important Questions:

1. **Explain Dc Drive using chopper.**
    - Appeared in: SUM 24 (Q5a(OR), 03 marks)
2. **Explain regenerative braking in electrical vehicles and state advantages of regenerative braking.**
    - Appeared in: SUM 24 (Q5b(OR), 04 marks)
3. **Explain single phase full wave converter drive in brief.**
    - Appeared in: SUM 24 (Q5c(OR), 07 marks)
4. **Explain the speed control of dc motor by SCR chopper circuit.**
    - Appeared in: WIN 24 (Q5b, 04 marks)
5. **State advantages of electric drive. / Draw block diagram of Electric drives.**
    - Appeared in: WIN 24 (Q5a(OR), 03 marks)
6. **Explain variable frequency drive using block diagram.**
    - Appeared in: WIN 23 (Q5c(OR), 07 marks)
7. **Explain single phase converter drive for DC motor.**
    - Appeared in: WIN 23 (Q5c(OR), 07 marks) *[Note: This question appears twice in the paper]*

Unit V - Cycloconverters and Advanced Drives

Repeated Questions:

1. **Explain the bridge type cyclo converter in which output frequency is one fourth of the input frequency with purely resistive load.**
    - Appeared in: WIN 23 (Q5c, 07 marks), WIN 24 (Q5c, 07 marks)
2. **Explain the center tapped transformer type cyclo converter with purely resistive load.**
    - Appeared in: WIN 23 (Q5c(OR), 07 marks), SUM 24 (Q5b(OR), 04 marks)
3. **State the classification of cyclo converters.**
    - Appeared in: WIN 23 (Q5a, 03 marks)

Other Important Questions:

1. **Explain single phase to single phase step down (one third) mid-point cycloconveter with resistive load.**
    - Appeared in: SUM 24 (Q5c, 07 marks)
2. **Explain single phase to single phase bridge type cycloconverter with purely resistive load.**
    - Appeared in: WIN 23 (Q5c(OR), 07 marks)

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