CBCS SCHEME

USN | | | | | | | | | |

18MT62

Sixth Semester B.E. Degree Examination, June/July 2024
Power Electronics

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Explain the control characteristics of : i) GTO ii) MCT iii) SCR iv) SITH v) BJT. With help of waveforms and circuit diagrams. **(10 Marks)**

b. List the different types power converters and mention their functions. Draw waveform and circuits. **(10 Marks)**

OR

2 a. With the help of waveforms, explain the switching characteristics of MOSFET. **(10 Marks)**

b. What are the necessity of isolation of gate and base drives? Explain how the isolation can be achieved. **(10 Marks)**

Module-2

3 a. Explain the VI characteristics of SCR with different operating modes. **(10 Marks)**

b. With the help of circuit diagram, explain the principle of complementary commutation. **(10 Marks)**

OR

4 a. What are the conditions to be satisfied for successful commutation? Explain natural commutation. **(10 Marks)**

b. A UJT is used to trigger the thyristor whose minimum gate triggering voltage is 6.2V. The UJT ratings are : $\eta = 0.66$, $I_p = 0.5mA$, $I_v = 3mA$, $R_{B1} + R_{B2} = 5k\Omega$ leakage current = 3.2mA, $V_p = 14V$, $I_V = 1V$ oscillator frequency is 2KHz and capacity $C = 0.04\mu F$. Design the complete circuit. **(10 Marks)**

Module-3

5 a. Explain the principle of ON-OFF control and phase control techniques used in an AC voltage controller. **(10 Marks)**

b. Explain the operation of single phases semi converter with circuit, waveforms. **(10 Marks)**

OR

6 a. With neat circuit diagrams and waveforms, explain the operation of half wave controlled rectifier with RL load. **(10 Marks)**

b. An on/off controller, with an input of 230V, 50Hz is connected to a resistive load of 20Ω. The circuit is operating with the switch ON for 30 cycles and switch off for 30 cycles. Determine: i) rms output current ii) Input power factor. **(10 Marks)**

Module-4

7 a. Explain the operation of a step down chopper with RL load. **(10 Marks)**

b. A DC chopper has a resistive load of 20Ω and input voltage $V_S = 220V$. When the chopper is on, its voltage drop is 1.5V and chopping frequency is 10KHz. If duty cycle is 80% determine the average output voltage, rms output voltage and chopper on time. **(10 Marks)**

OR

8 a. Explain the principle of operation of a step up chopper. Draw waveforms and circuit diagram. **(10 Marks)**

b. Input to the step up chopper is 200V. The output required is 600V. If the conducting time of thyristor is 200μs. Compute :

i) Chopping frequency

ii) If pulse width is halved for constant frequency of operation find the new output voltage. **(10 Marks)**

Module-5

9 a. With a neat circuit diagram, explain the operation of a three phase transistorized inverter in 180° conduction mode with star connected R – load. **(10 Marks)**

b. Explain the principle of single phase half bridge inverter with relevant circuit diagram and waveforms. **(10 Marks)**

OR

10 a. Explain single pulse width modulation for voltage control of single phase inverter. **(10 Marks)**

b. Write a note on performance parameter of inverter :

i) Harmonic factor of n^{th} harmonic

ii) Total harmonic distortion (THD)

iii) Distortion factor (D.F.). **(10 Marks)**

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