H.T No: | | | | | | | | | | | **R18** **Course Code: B30301**

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

M.Tech I Semester Supplementary Examinations September-2023

Course Name: POWER CONVERTERS

(Power Electronics)

Date: 05.09.2023 FN **Time: 3 hours** **Max.Marks: 70**

(Note: Assume suitable data if necessary)

PART-A

Answer all FIVE questions (Compulsory)

Each question carries FOUR marks. **5x4=20M**

1. Identify the different modes of operation of thyristor with the help of V-I characteristics. 4M
2. Describe the working of 3Φ fully controlled bridge converter in the rectifying mode. 4M
3. Discuss the need for resonant switching in SMPS. 4M
4. Describe multi stage sequence control in ac voltage controller. 4M
5. Demonstrate the use of inverters in uninterrupted power supply. 4M

PART-B

Answer the following. Each question carries TEN Marks. **5x10=50M**

6. A). A single-phase full converter connected to 230V; 50 Hz source is feeding a load R = 10 ohms in series with a large inductance that makes the load ripple free. For a firing angle of 45 degree, calculate the input and output performance parameters of this converter. 10M

OR

6. B). Analyze the performance parameters of half controlled converter with RL load. 10M

7. A). Explain the operation of three phase semi-converter with necessary circuit and waveforms. 10M

OR

7. B). Explain the operation of circulating and non-circulating current type three phase dual converter with necessary waveforms. 10M

8. A). The buck regulator has an input voltage Vs = 12 V. The required average output is Va = 5 V at R=500 Ω and the peak-to-peak output ripple voltage is 20 mV. The switching frequency is 25 kHz. If the peak-to-peak ripple current of inductor is limited to 0.8A, Evaluate the (i) the duty cycle (ii) the filter inductance (iii) the filter capacitor, and (iv) the critical values of L and C. 10M

OR

8. B). Describe the operation of Cuk converter and derive the expression for Peak-to-peak ripple currents of inductors and ripple voltages of capacitors, for continuous operation. 10M

(P.T.O..)

9. A). Discuss the principle of dingle phase AC to AC converter with neat sketch and relevant wave forms. 10M

OR

9. B). A bidirectional AC voltage controller is operating at 120 V, 60 Hz power supply. The delay angles for the thyristor are $\alpha 1 = \alpha 2 = 2\pi/3$. A load resistance RL of 10 Ohms is being fed by this AC voltage controller. Determine (i) RMS output voltage, (ii) Input power factor, (iii) Average current of thyristors, (iv) RMS current of thyristors. 10M

10. A). Apply an appropriate PWM technique for three phase voltage source inverter. 10M

OR

10. B). Explain the operation of three phase bridge inverter for 180° conduction mode with necessary waveforms. 10M

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