

(3 Hours)

[Total Marks : 100

- N.B. :** (1) Question No. 1 is **compulsory**.
 (2) Attempt any **four** questions from remaining **six** questions.
 (3) **Figures** to the **right** indicate **full** marks.
 (4) Assume **suitable** additional data if **necessary**.

- i. Attempt the following :- 20
 - (a) Explain regenerative braking for D.C. motors.
 - (b) List the merits and demerits of on-line and off-line UPS.
 - (c) Explain how to quadrant type B chopper operates in first and fourth quadrants.
 - (d) Compare voltage source and current source inverters.

2. (a) Draw and explain the operation of single phase semiconverter fed D.C. separately excited motor with relevant waveforms and expressions. 10
 (b) Explain with neat diagram the operation of rotor resistance control using chopper. 10

3. (a) Explain with neat diagram the working of parallel inverter. Explain the need of feedback diodes. Draw capacitor, SCR and load voltage waveforms. 10
 (b) Describe the principle of step-up chopper. Derive an expression for the average output voltage. State the assumptions made. 10

4. (a) Explain with relevant circuit diagram the static Scherbius drives for obtaining speeds below as well as above synchronous speeds. 10
 (b) Explain in detail the operation of dual converter with circulating current. List the advantages and disadvantages of the same. 10

5. (a) A 220 V, 1500 rpm, 10 A separately excited d.c. motor has an armature resistance of 1 Ω . It is fed from a single phase fully controlled bridge rectifier with an a.c. source voltage of 230 V, 50 Hz. Assuming continuous load current, compute :- 10
 - (i) Motor speed at firing angle of 30° and torque of 5 Nm.
 - (ii) Developed torque at the firing angle of 45° and speed of 1000 rpm.
- (b) Describe single phase McMurray-Bedford full bridge converter with neat diagram and related voltage and current waveforms. 10

6. (a) Draw and explain the operation of flyback converter with relevant waveforms. 10
 (b) Explain the operation of load commutated chopper with neat circuit diagram and associated current and voltage waveforms. 10

7. Write short notes on the following :- 20
 - (a) V/f control for induction motor
 - (b) Effect of source inductance on performance of converter.
 - (c) Harmonic reduction in inverters.