

- (ix) The concept of V/f control of inverters driving induction motors results in
- Constant torque operation
 - Speed reversal
 - Reduced magnetic loss
 - Harmonic elimination
- (x) Which speed control method is preferred for constant torque drive?
- Field control
 - Armature voltage control
 - Mechanical loading system
 - None

PART — B

Answer any *six* of the following questions
(from question number 2 to question number 9).

(6 × 15 = 90)

2. (a) What do you understand by Electric Drives? Give the broad classification of Electric Drives with suitable examples. (10)
- (b) Does a load torque always oppose the driving torque? If not, illustrate with suitable examples, the situations in which load torque assists the driving torque. What this type of load torque is called? (5)

- (iii) A motor has the following duty cycle
- Load rising from 200 to 400 kW for 4 minutes
 - Uniform loading of 300 kW for 2 minutes
 - Regenerative braking, power returned to supply, 50 kW to 0 for 1 minute
 - Remain idle for 1 minute
- Estimate suitable rating for the motor. (6)
- (iv) Define the following types of loading conditions:
- Continuous duty
 - Short time duty
 - Intermittent periodic duty (3 × 3 = 9)
- (a) Explain the dynamic braking applicable to DC motor. How braking torque can be controlled in the method? (7)
- (b) A 220 V DC shunt motor having an efficiency of 85% drives a hoist having an efficiency of 80%. Calculate the current drawn from the supply to raise a load of 400 kg at 2.5 m/s. What resistance must be added to the circuit in order to lower the load at 2.5 m/s using rheostatic braking, assuming that efficiencies remain the same? (8)
- (a) Represent a dc shunt motor in dynamic condition with block diagram and hence derive the expression for voltage-speed transfer function of the motor at constant load. (10)
- (b) A constant frequency chopper is used to control the speed of a dc traction motor from 220 V dc supply. The combined armature and field resistance is 0.2 ohm. The average current in the circuit is 25 A and chopper frequency is 200 Hz. Determine the pulse width, if the average value of back emf is 100 V. (5)