(3 Hours) [Total Marks :80

N.B. : (1) **Question** No.1 is compulsory.
    (2) Answer any **THREE** questions out of the remaining **FIVE** questions.
    (3) Assume suitable data if necessary and justify them.
    (4) **Figure** to the **right** indicates marks.

1. (a) Draw the block diagram of an electrical drive. What are the functions of power modulator. Explain.   5

   (b) Explain regenerative braking of separately excited motor by chopper control.   5

   (c) Why stator voltage control is considered to be suitable for low power fan and pump drives.   5

   (d) Describe the operation of a variable reluctance stepper motor.   5

2. (a) Explain load equalization and derive the moment of inertia of the flywheel required for load equalization.   10

   (b) A drive has the following parameters: 10
      $T = 150 - 0.1 N$, N-m, where N is the speed in rpm.
      Load torque $T_l = 100$, N-m.
      Initially the drive is operating in steady-state. The characteristics of the load torque are changed to
      $T_l = -100$, N-m. Calculate initial and final equilibrium speeds.

3. (a) Write a note on closed loop speed control used in multi motor drives.   10

   (b) A constant speed drive has the following duty cycle: 10
     (i) Load rising from 0 to 400kW: 5min
     (ii) Uniform load of 500kW: 5min
     (iii) Regenerative power of 400kW returned to the supply: 4min
     (iv) Remains idle for : 2mins.
   Estimate power rating of the motor.
   Assume losses to be proportional to (power)^2.

4. (a) Explain 1-φ fully- controlled rectifier control of dc separately excited motor with discontinuous conduction mode of operation. Also draw its speed - torque characteristics.   10

   (b) Explain Brushless dc motor drive for Servo applications.   10

TURN OVER

1

5. (a) Explain ac dynamic braking of a wound rotor motor with equivalent circuit and speed torque curves. **10**

(b) Variable frequency control is more efficient than stator voltage control. Explain. **10**

6. (a) Draw and explain Static Scherbius drive. **10**

(b) Explain the principle of vector control and draw the block diagram of Direct Vector Control Scheme and explain it. **10**