

Q.P. Code : 721700

(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 $T_1 = 100$, N-m.
 Initially the drive is operating in steady-state. The characteristics of the load torque are changed to
 $T_1 = - 100$, 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 π - ϕ fully- controlled rectifier control of de separately excited motor with discontinuous conduction mode of operation. Also draw its speed - torque characteristics. **10**
 (b) Explain Brushless de motor drive for Servo applications. **10**

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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
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