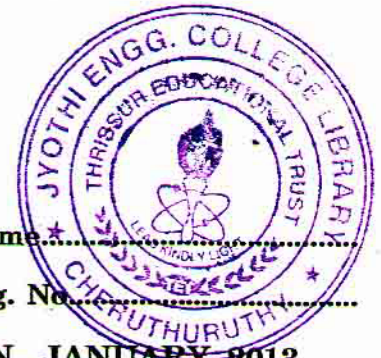


D 32791

(Pages : 3)

Name:
Reg. No.



FIRST SEMESTER M.TECH. DEGREE EXAMINATION, JANUARY 2013

EPD/EPE 10 104—ELECTRIC DRIVES

Time : Three Hours

Maximum : 100 Marks

Answer any five by choosing at least one from each module.

Module 1

1. (a) Explain how motor rating is determined in drive system ? (8 marks)
- (b) Write short notes on load equalization. (12 marks)
2. Why modeling is necessary ? Describe the modeling of d.c. shunt motor in armature controlled system. (20 marks)

Module 2

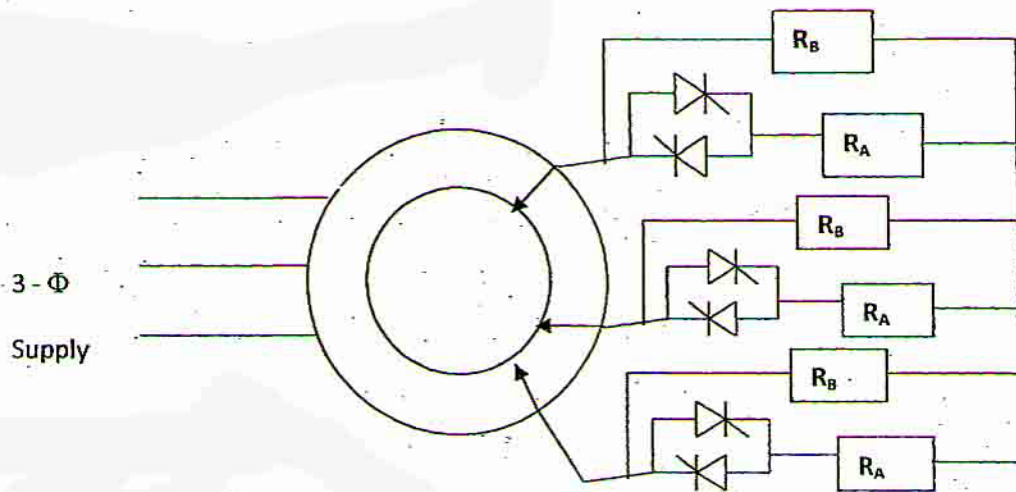
3. Explain the working of four quadrant chopper fed separately excited d.c. motor drive with required waveform. (20 marks)
4. (a) A 230 V D.C., separately excited D.C. motor takes 50A at a speed of 800 r.p.m. It has an armature resistance of 0.4Ω . The motor is controlled by two quadrant D.C. chopper with an input voltage of 230V. Assuming continuous conduction, calculate the speed and torque for the following conditions,
 - (i) motoring operation at a duty ratio of 0.3.
 - (ii) regenerative braking operation at a duty ratio of 0.4. Also draw the power circuitry. (10 marks)
- (b) Classify and explain about different electrical braking methods as applied to D.C. motors. (10 marks)

Turn over

Module 3

5. (a) A three-phase wound rotor induction motor is connected directly to a three-phase supply of constant voltage and frequency. Pairs of inverse-parallel SCRs are incorporated into the secondary windings using the connection of figure. In values referred to primary turns, $R_A = 10R_B$ and R_A is five times the secondary winding resistance R_2 . Sketch and explain approximate torque-speed characteristics for the two conditions.

(i) $\alpha = 0^\circ$. (ii) $\alpha = 180^\circ$. What approximate range of speed control is possible?



(10 marks)

- (b) Explain the theoretical principle of stator voltage control of three-phase induction motor from its basic torque equation. (10 marks)
6. (a) A three-phase, delta connected, 6-pole, 50 Hz, 400 V, 925 r.p.m., squirrel-cage induction motor has the following parameters :
- $$R_1 = 0.2\Omega; R_2 = 0.3\Omega; X_1 = 0.5\Omega; X_2 = 1\Omega.$$

The motor is fed from a voltage source inverter with a constant V/f ratio from 0 to 50 Hz and constant voltage of 400V above 50 Hz frequency.

- (i) Determine the break-down torque for a frequency of 100 Hz as a ratio of its value at 50 Hz.
- (ii) Also obtain the torque at the rated motor current and 75 Hz as the ratio of rated full-load torque of the motor.
- (iii) Calculate the motor torque at 30 Hz and a slip-speed of 60 r.p.m.

(12 marks)

- (b) A 2.8 kW 400 V, 50 Hz, 4 pole 1,370 r.p.m. delta connected squirrel cage induction motor has the following parameters referred to the stator.

$$R_s = 2\Omega, R_r' = 5\Omega, X_s = X_r' = 5\Omega, \text{ and } X_m = 80\Omega.$$

Motor speed is controlled by stator voltage control method. When driving a fan load runs at rated speed at rated voltage. Calculate

- (i) motor terminal voltage, current and torque at 1,200 r.p.m.
- (ii) motor speed, current and torque for the terminal voltage of 300 V.

(8 marks)

Module 4

7. What is the basic difference between true synchronous mode and self-control mode in variable frequency control of synchronous motor? Explain them in detail.

(20 marks)

8. (a) Write short notes on four quadrant operation of synchronous motor drive. (10 marks)
- (b) Discuss the closed loop power factor control in VSI fed synchronous motor drive.

(10 marks)