

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2490

Roll No.

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B. Tech.

(SEM. VI) THEORY EXAMINATION 2010-11

INTRODUCTION TO ELECTRIC DRIVES

Time : 2 Hours

Total Marks : 50

Note : Attempt **all** questions. All questions carry equal marks.

1. Attempt any **two** parts of the following : **(5×2=10)**

- (a) Explain the basic principle of thyristor. Explain forward conduction mode of thyristor.
- (b) Explain two transistor model of a thyristor. Explain holding and latching current.
- (c) Explain thyristor turn-on methods. What are the application of thyristor.

2. Attempt any **two** parts of the following : **(5×2=10)**

- (a) Explain basic principle of phase control. Define single phase half wave circuit with RL load.

- (b) A single-phase 230 V, 1 kW heater is connected across 1-phase, 230 V, 50 Hz supply through an SCR for firing angle delays of 45° and 90° . Calculate the power absorbed in the heater element.
- (c) Explain single phase full wave bridge converter. Also explain three phase bridge inverter.
3. Attempt any two parts of the following : (5×2=10)
- (a) A step-up chopper has input voltage 220 V and output voltage of 660 V. If the non-conducting time of thyristor chopper is 100 μ s, compute the pulse width of output voltage. In case pulse width is halved for constant frequency operation, find the new output voltage.
- (b) Explain the basic principle of operation of step up and step down chopper with V-I characteristics.
- (c) Define the basic principle of operation of cycloconverter. Explain the working of 1- ϕ and 3- ϕ half wave cycloconverter.
4. Attempt any two parts of the following : (5×2=10)
- (a) Explain basic machine equations. Define DC motor speed control.
- (b) Explain Single- ϕ dual converter drives, also explain two-quadrant chopper drives.

(c) - Explain four quadrant chopper drives. Define 3- ϕ semiconductor drives.

5. Attempt any two parts of the following : (5 \times 2=10)

(a) Define speed control of induction motors. Define method of resistance control.

(b) A 3- ϕ , 400 V, 15 kW, 1440 rpm, 50 Hz star connected induction motor has rotor leakage impedance of $0.4 + j1.6 \Omega$. Starter leakage impedance and rotational losses are assumed negligible. If this motor is energised from 120 Hz, 400 V, 3- ϕ source, then calculate :

(i) the motor speed at rated load

(ii) the slip at which maximum torque occurs and

(iii) the maximum torque.

(c) What are ac drives ? Give the merits and demerits of ac drives with respect to dc drives.