



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

PAPER ID : 131604

Roll No.

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## B. Tech.

### (SEM. VI) THEORY EXAMINATION, 2014-15 INTRODUCTION TO ELECTRIC DRIVES

Time : 2 Hours]

[Total Marks : 50

- 1 Attempt any two parts : 2×5=10
- (a) Explain the various terms involved in turn on and turn off time of SCRs in dynamic characteristics. Why circuit turn off time is kept larger ?
  - (b) Define di/dt and dv/dt protection of SCRs. What are the components used to protect SCR ?
  - (c) Give various triggering methods in SCR. Explain in detail pulse triggering method and requisite method.
- 2 Attempt any two parts of the following : 2×5=10
- (a) Derive the expressin of a 1-phase full wave bridge rectifier fully controlled for RLE load and also draw the requisite waveforms.

- (b) Explain the operation of three phase half controlled full wave rectifier with desired waveforms.
- (c) Explain control strategies of chopper with respect to step down chopper. Also classify and explain the choppers according to quadrant operation.

3 Attempt any two parts of the following :  $2 \times 5 = 10$

- (a) Give the difference between  $180^\circ$  and  $120^\circ$  modes of three phase inverter with relevant waveforms of phase and line voltages.
- (b) Explain the basic principle of step down cycloconverter.
- (c) Write short notes on following :
  - (i) Series inverter
  - (ii) Jones chopper
  - (iii) 3- $\phi$  to 3- $\phi$  step down cycloconverter.
  - (iv) Power factor improvement in dc drives.
  - (v) Self control scheme of synchronous motor drive.

4 Attempt any two parts of the following :  $2 \times 5 = 10$

- (a) The speed of separately-excited dc motor is controlled through 1-phase half wave controlled from 230 V mains. The motor armature resistance is 0.5 Ohm and motor constant is  $K = 0.4 \text{ V-s/rad}$  for load torque of 20 Nm at 1500 rpm and for constant armature current, calculate :
  - (i) Firing angle of converter.
  - (ii) RMS value of thyristor current.
  - (iii) I/P power factor of the motor.

- (b) Describe the regenerative braking of chopper fed separately excited dc motor. Illustrate the answer with circuit diagram and relevant waveforms.
- (c) Define the basic principle of operation of cyclo-converter. Explain the working of 1-phase and 3-phase cycloconverter.

5 Attempt any two parts of the following :  $2 \times 5 = 10$

- (a) Explain four quadrant chopper drives. Explain three phase semiconductor drives.
- (b) Enumerate the various methods of speed control of 3-phase induction motor when fed through semiconductor devices.
- (c) Describe the Kramer drive and show that steady state torque is not influenced by whether a transformer is used or not ?