

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VI • EXAMINATION – SUMMER • 2014****Subject Code: 162404****Date: 28-05-2014****Subject Name: Industrial Drives and Control-I****Time: 10:30 am - 01:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Notations used have usual meaning.

- Q.1** (a) Explain three phase half wave controlled rectifier with necessary waveforms. **07**  
(b) What is Electrical Drive? Explain its working along with block diagram. **07**
- Q.2** (a) Explain working of series DC motor with its speed/torque and current/torque characteristics. **07**  
(b) A single phase full converter operating from a single phase 230V, 50 Hz supply has a purely resistive load of  $R=15\ \Omega$ . If the average load current is 11.78A, calculate (1) the delay angle  $\alpha$ , (2) rms value of output voltage and current. **07**
- OR**
- (b) A chopper used for ON-OFF control of a separately excited dc motor has a supply voltage of 230 V dc, an on time of 8 ms and an off time of 12 ms. The armature resistance is 3  $\Omega$ . Assuming continuous conduction of the motor current, calculate the average load current when the motor runs at a speed of 1200 rpm and has a voltage constant  $k_v=0.5\ \text{V/rad/s}$  (Back emf constant). **07**
- Q.3** (a) Explain working of single phase semi- controlled converter for speed control of separately excited DC motor **07**  
(b) Describe working of single phase dual converter for speed control of DC motor. **07**
- OR**
- Q.3** (a) Explain constant torque and constant horse power operations of DC motor. **07**  
(b) Discuss two quadrant operation of DC motor operated from chopper circuit. **07**
- Q.4** (a) Describe closed loop control of DC motor with inner current loop control. **07**  
(b) Explain servo-motor drive system with neat diagram. **07**
- OR**
- Q.4** (a) Write a short note on chopper based braking of DC motor. **07**  
(b) Draw and Explain class A chopper circuit for DC motor. **07**
- Q.5** (a) Discuss speed control of DC motor using phase locked loop. **07**  
(b) Explain PID controller with neat sketch and draw necessary responses. **07**
- OR**
- Q.5** (a) Write a brief note on permanent magnet motor drive. **07**  
(b) Explain multi-phase chopper circuit for DC motor control with its merits and demerits. **07**

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