

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VI (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2160910

Date: 08/05/2017

Subject Name: Electrical Drives

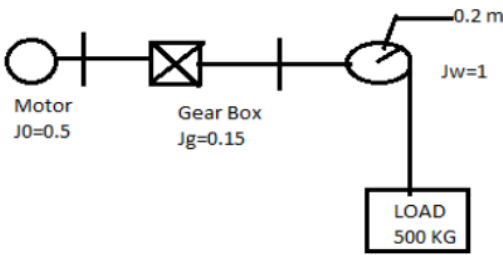
Time: 10:30 AM to 01:00 PM

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		MARKS
Q.1	Short Questions	14
1	State two methods to get variable dc from fixed ac source.	
2	Write generalized equation for calculating equivalent moment of inertia for load having only rotational load.	
3	Show all friction components on single graph.	
4	Draw speed-torque curves of different types of DC motors in a single graph.	
5	Define plugging.	
6	Give full name of MRAC in regards with electric drive.	
7	State limitations of V/f control I.M. drive.	
8	What is the importance of critical speed for dc separately excited motor drive operated with single phase fully controlled rectifier?	
9	What do you understand by constant flux operation in ac drives.	
10	Give disadvantages of group drive system.	
11	What is a dual converter? When is it used?	
12	Stator voltage control in induction motor is suited for fan load. Why?	
13	What is maximum power point tracker in regards with solar drives?	
14	Which dc voltage levels are used in traction drives in India?	
Q.2	(a) Draw block diagram of electric drive and give function of each block.	03
	(b) Derive the condition for steady state stability of the drive.	04
	(c) Explain the Multi quadrant operation of electrical drives with suitable conventions and example.	07
	OR	
	(c) Motor drives the winch drum through a reduction gear with a gear tooth ratio of 0.1. The friction torque at winch shaft is 15 N-m and at motor shaft 10 N-m. Motor speed is 1500 rpm. Calculate the equivalent moment of inertia of the drive referred to the motor shaft and motor torque if gears have an efficiency of 90%. All inertia shown in diagram is in kg-m². Radius of the winch is 0.2 m.	07



- Q.3** (a) Give advantages of PWM inverters. **03**
(b) Write a short note on sinusoidal PWM method. **04**
(c) Explain regenerative braking control in chopper based DC drive. **07**

OR

- Q.3** (a) Explain the Type A chopper circuit. **03**
(b) Explain the Type B chopper circuit. **04**
(c) Explain single phase full wave bridge type controlled converter with RLE load and with freewheeling diode. Also draw all the necessary waveforms and derive equations of output DC voltage and current. **07**
- Q.4** (a) Explain dynamic model of DC machine. **03**
(b) Why speed torque characteristic of PMDC motor is superior to conventional DC motor? **04**
(c) Explain position control method for DC motor. **07**

OR

- Q.4** (a) What is Sliding mode control? State its advantages. **03**
(b) Explain principle of Vector control of induction motor. **04**
(c) Explain d-q model of induction motor in detail. Also state its application in the field of drive. **07**
- Q.5** (a) Draw block diagram of solar and battery operated drive. **03**
(b) Explain requirement of servo motor drive. **04**
(c) What is load equalization in regards with electric drives? Why it is required? Derive equation to find moment of inertia of flywheel with necessary assumptions. **07**

OR

- Q.5** (a) What is self tuning control? **03**
(b) List and explain qualities required for a traction drive. **04**
(c) Explain CSI operated drive. State its advantages and area of application. **07**
