

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER- VI EXAMINATION – SUMMER 2020

Subject Code: 2160913

Date: 04/11/2020

Subject Name: CONTROL OF 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 | (a) Define the Electrical drives system with appropriate diagram. | 03 |
| | (b) Explain four quadrant operation of electrical drives. | 04 |
| | (c) Identify the characteristics of load torque for different application. | 07 |
| Q.2 | (a) List the different speed control technique for DC series control. | 03 |
| | (b) Discuss the steady state analysis of electrical drive. Derive limit of steady state condition. | 04 |
| | (c) Explain the dynamic model of the dc motor drive. | 07 |
| | OR | |
| | (c) A 220 V ,1500 rpm , 10 a separately excited dc motor is fed from 1 phase fully controlled rectifier with a source voltage 230 volt 50 hz and $R_a = 2$ ohm conduction can be assumed to be continuous. calculate firing angle at half rated torque and 500 rpm. | 07 |
| Q.3 | (a) Compare FOC and DTC drives. | 03 |
| | (b) Explain the closed loop speed control technique for DC motor. | 04 |
| | (c) Explain the motoring and regenerative operation of dc series motor connected with diode and transistor based dc chopper circuits. | 07 |
| | OR | |
| Q.3 | (a) Define the principle of vector control. | 03 |
| | (b) Explain the Clarke transformation technique. | 04 |
| | (c) Explain dynamics of motor load coupled with transmission gear system. | 07 |
| Q.4 | (a) List the different effects of harmonics on operation of induction motor. | 03 |
| | (b) Compare the CSI and VSI types inverters. | 04 |
| | (c) Apply V / F control of induction motor drives | 07 |
| | OR | |
| Q.4 | (a) List advantages of V/F control over other control technique | 03 |
| | (b) Compare scalar control and vector control. | 04 |

(c) Apply the slip recovery scheme for speed controlling of induction motor drive. **07**

- Q.5** (a) Discriminate the constant torque and constant power region from torque speed characteristics of 3 phase induction motor. **03**
(b) Discuss the types of servo motor drive **04**
(c) Explain direct torque control of induction motor drive **07**

OR

- Q.5** (a) List out the different types of references frame used in induction motor modeling. **03**
(b) Explain the different electrical breaking system. **04**
(c) Utilize solar powered drive for solar water pump application. **07**

www.FirstRanker.com