

Code No: R32025

R10

Set No: 1

III B.Tech. II Semester Regular Examinations, April/May -2013

POWER SEMICONDUCTOR DRIVES

(Electrical and Electronics Engineering)

Time: 3 Hours

Max Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

- (a) Discuss various DC series motor speed control techniques.
(b) A 220V dc series motor runs at 1000 rpm (clockwise) and takes an armature current of 100A when driving a load with a constant torque. Resistances of the armature and field windings are 0.05Ω each. Find the magnitude and direction of motor speed and armature current if the motor terminal voltage is reversed and the number of turns in field winding is reduced to 80%. Assume linear magnetic circuit
- (a) Discuss about the basic characteristics of a separately excited dc motor indicating constant power and constant torque regions.
(b) Write short notes on the following
(i) purpose of free wheeling diode
(ii) continuous and discontinuous modes of operation.
- Draw the output voltage of 3- Φ full bridge converter for a firing angle of 120° considering DC motor as load? Assume continuous ripple free load current. Obtain the average output voltage expression.
- (a) Explain various electric braking methods.
(b) Discuss the how four quadrant operation of DC motor is achieved with dual converters.
- (a) Explain the operation of chopper fed separately excited DC motor.
(b) A 230V, 960 rpm and 200A separately excited dc motor has an armature resistance of 0.02Ω . The motor is fed from a chopper which provides both motoring and braking operations. The source has a voltage of 230V. Assuming continuous conduction (i) calculate duty ratio for motoring operation at rated torque and 350rpm. (ii) Calculate duty ratio for braking operation at rated torque and 350rpm.
- (a) Draw the speed torque characteristics which are obtained by stator voltage variation of 3-phase induction motor.
(b) Explain the closed loop operation of induction motor with the help of block diagram.
- (a) State the major features of rotor resistance control of wound rotor induction motor.
(b) Explain them static rotor resistance control of induction motor with a circuit diagram.
- Describe the open loop and closed loop methods of speed control of synchronous motor using VSI.



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Set No: 3

III B.Tech. II Semester Regular Examinations, April/May -2013

POWER SEMICONDUCTOR DRIVES

(Electrical and Electronics Engineering)

Time: 3 Hours

Max Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

1. Explain various speed control techniques for induction motor in detail.
2. (a) Explain the different modes of operation of 1- Φ semi controlled rectifier-fed separately excited motor.
(b) A 200V, 1000 rpm, 10A separately, excited dc motor is fed from a single-phase full converter with ac source voltage of 230V, 50Hz. Armature circuit resistance is 1Ω . Armature current is continuous. Calculate firing angle for half the rated motor torque at (-500) rpm.
3. (a) Draw the output voltage of 3- Φ full bridge converter for a firing angle of 120° considering DC motor as load?
(b) Explain the speed torque characteristics of separately excited dc motor fed from a three phase half controlled rectifier drive.
4. (a) Explain closed loop operation of DC motor with a block diagram.
(b) Discuss the how four quadrant operation of DC motor is achieved with dual converters.
5. (a) Explain the time ratio control, current limit control in case of chopper fed dc motors.
(b) Draw the circuit diagram of two-quadrant chopper for separately excited DC motor and relevant waveforms for I and II quadrant operation.
6. Explain the operation of three phase squirrel-cage induction motor when fed from three phase ac voltage controller for speed control with the help of neat circuit diagrams for both star and delta connected stator. Sketch the speed-torque characteristics for the range of applied voltages.
7. Explain the operation of three phase slip ring induction motor when static krammer drive is employed. Draw the speed torque characteristics and phasor diagram.
8. With suitable circuit diagrams discuss the principle of operation of self controlled synchronous motor drive.



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Set No: 4

III B.Tech. II Semester Regular Examinations, April/May -2013

POWER SEMICONDUCTOR DRIVES

(Electrical and Electronics Engineering)

Time: 3 Hours

Max Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

1. Explain various speed control techniques for induction motor in detail.
2. (a) Discuss about the basic characteristics of a dc series motor indicating constant power and constant torque regions.
(b) A 200V, 875 rpm, 150 A separately excited dc motor has an armature resistance of 0.06Ω . It is fed from a single-phase fully controlled rectifier with an ac source voltage of 220V, 50 Hz. Assuming continuous conduction, calculate firing angle for rated motor torque and 750 rpm.
3. The speed of a 100kW, 1000rpm, separately excited dc motor is controlled by a three phase full converter. The specifications of the converter are 460V, 300A. The input to the converter is a 3- Φ , 415V, 50 Hz ac supply. Determine (a) firing angle of the converter and power factor at rated speed. (b) firing angle and power factor at 10% rated speed.
4. (a) Explain various electric braking methods.
(b) What is four quadrant operation of DC motor? Explain.
5. (a) Explain the operation of chopper fed separately excited DC motor.
(b) Explain the principle of closed loop control of chopper controlled dc drive using suitable block diagram.
6. (a) Explain the family of torque-speed characteristics of 3-phase induction motor obtained by stator voltage variation.
(b) Explain the control of a three-phase squirrel cage induction motor with delta connected stator, fed from a three-phase AC voltage controller.
7. (a) Draw the speed-torque characteristics of a rotor resistance controlled induction motor and explain the effect of rotor variation.
(b) Explain them static rotor resistance control of induction motor with a circuit diagram.
8. With a neat block diagram explain the closed loop operation of synchronous motor drives.

