

Code No: RR410202

RR

Set No. 2

IV B.Tech I Semester Examinations, NOVEMBER 2010
POWER SEMICONDUCTOR DRIVES
Electrical And Electronics Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

- For stator voltage control scheme of a 3-phase Induction motor discuss about speed range, regeneration, harmonics, torque pulsating, power factor, cost, efficiency and applications.
 - Draw a block schematic diagram for automatic speed control of 3 phase cage Induction motor using solid state AC Voltage Controller on stator side. [8+8]
- Draw the block diagram of a closed loop synchronous motor drive fed from VSI and explain. [16]
- A class-A chopper, operating in time-ratio control, is supplying the armature of the separately excited dc motor. Show that the motor speed-torque relationship is $\omega_m = \frac{\delta V}{K} - \frac{R_a}{K^2} T_a$, Where V - chopper input voltage, R_a - Armature resistance, T_a - motor torque, K- torque constant. [16]
- How is the output voltage of a VSI improved by PWM techniques? Explain how you will use this converter for speed control of a synchronous motor. [16]
- Explain how four-quadrant operation is achieved by dual converters each of ϕ full wave configuration for d.c. separately excited motor.
 - Distinguish between circulating current and non-circulating current mode of operation. [10+6]
- With neat circuit diagram and waveforms, explain dynamic braking of separately excited motor by single phase converter.
 - A dc shunt motor has the armature resistance of 0.04Ω and the field winding resistance of 10Ω . Motor is coupled to an over hauling load with a torque of 400N-m. Following magnetization curve was measured at 600 rpm:

Field Current, A	2.5	5	7.5	10	12.5	15	17.5	20	22.5	25
Back emf, v	25	50	73.5	90	102.5	110	116	121	125	129

Calculate the value of R_B when the motor is required to hold overhauling load at 1200rpm. [8+8]

- Compare CSI and VSI drives.
 - Show that a variable frequency Induction motor drive develops at all frequencies the same torque for a given slip-speed when operating at constant flux. [8+8]

Code No: RR410202

RR

Set No. 2

8. (a) Draw and explain a closed loop operation for a static Kramer controlled drive.
(b) In which way a static Kramer Control is different from static Scherbius drive? [10+6]

FIRSTRANKER

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Set No. 4

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POWER SEMICONDUCTOR DRIVES
Electrical And Electronics Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

- How is the output voltage of a VSI improved by PWM techniques? Explain how you will use this converter for speed control of a synchronous motor. [16]
- For stator voltage control scheme of a 3-phase Induction motor discuss about speed range, regeneration, harmonics, torque pulsating, power factor, cost, efficiency and applications.
 - Draw a block schematic diagram for automatic speed control of 3 phase cage Induction motor using solid state AC Voltage Controller on stator side. [8+8]
- With neat circuit diagram and waveforms, explain dynamic braking of separately excited motor by single phase converter.
 - A dc shunt motor has the armature resistance of 0.04Ω and the field winding resistance of 10Ω . Motor is coupled to an over hauling load with a torque of 400N-m . Following magnetization curve was measured at 600rpm :

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Back emf, v	25	50	73.5	90	102.5	110	116	121	125	129

Calculate the value of R_B when the motor is required to hold overhauling load at 1200rpm . [8+8]

- Draw the block diagram of a closed loop synchronous motor drive fed from VSI and explain. [16]
- A class-A chopper, operating in time-ratio control, is supplying the armature of the separately excited dc motor. Show that the motor speed-torque relationship is $\omega_m = \frac{\delta V}{K} - \frac{R_a}{K^2} T_a$, Where V - chopper input voltage, R_a - Armature resistance, T_a - motor torque, K- torque constant. [16]
- Compare CSI and VSI drives.
 - Show that a variable frequency Induction motor drive develops at all frequencies the same torque for a given slip-speed when operating at constant flux. [8+8]
- Explain how four-quadrant operation is achieved by dual converters each of 3ϕ full wave configuration for d.c. separately excited motor.
 - Distinguish between circulating current and non-circulating current mode of operation. [10+6]

Code No: RR410202

RR

Set No. 4

8. (a) Draw and explain a closed loop operation for a static Kramer controlled drive.
(b) In which way a static Kramer Control is different from static Scherbius drive? [10+6]

FIRSTRANKER

Code No: RR410202

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Set No. 1

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POWER SEMICONDUCTOR DRIVES

Electrical And Electronics Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. A class-A chopper, operating in time-ratio control, is supplying the armature of the separately excited dc motor. Show that the motor speed-torque relationship is $\omega_m = \frac{\delta V}{K} - \frac{R_a}{K^2} T_a$, Where V - chopper input voltage, R_a - Armature resistance, T_a - motor torque, K- torque constant. [16]
2. (a) Explain how four-quadrant operation is achieved by dual converters each of 3 ϕ full wave configuration for d.c. separately excited motor.
(b) Distinguish between circulating current and non-circulating current mode of operation. [10+6]
3. (a) Compare CSI and VSI drives.
(b) Show that a variable frequency Induction motor drive develops at all frequencies the same torque for a given slip-speed when operating at constant flux. [8+8]
4. How is the output voltage of a VSI improved by PWM techniques? Explain how you will use this converter for speed control of a synchronous motor. [16]
5. (a) Draw and explain a closed loop operation for a static Kramer controlled drive.
(b) In which way a static Kramer Control is different from static Scherbius drive? [10+6]
6. (a) With neat circuit diagram and waveforms, explain dynamic braking of separately excited motor by single phase converter.
(b) A dc shunt motor has the armature resistance of 0.04Ω and the field winding resistance of 10Ω . Motor is coupled to an over hauling load with a torque of 400N-m. Following magnetization curve was measured at 600 rpm:

Field Current, A	2.5	5	7.5	10	12.5	15.	17.5	20	22.5	25
Back emf, v	25	50	73.5	90	102.5	110	116	121	125	129

Calculate the value of R_B when the motor is required to hold overhauling load at 1200rpm. [8+8]

7. Draw the block diagram of a closed loop synchronous motor drive fed from VSI and explain. [16]
8. (a) For stator voltage control scheme of a 3-phase Induction motor discuss about speed range, regeneration, harmonics, torque pulsating, power factor, cost, efficiency and applications.

Code No: RR410202

RR

Set No. 1

- (b) Draw a block schematic diagram for automatic speed control of 3 phase cage Induction motor using solid state AC Voltage Controller on stator side. [8+8]

FIRSTRANKER

Code No: RR410202

RR

Set No. 3

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Answer any FIVE Questions
All Questions carry equal marks

1. (a) Explain how four-quadrant operation is achieved by dual converters each of 3 ϕ full wave configuration for d.c. separately excited motor.
 (b) Distinguish between circulating current and non-circulating current mode of operation. [10+6]
2. (a) Compare CSI and VSI drives.
 (b) Show that a variable frequency Induction motor drive develops at all frequencies the same torque for a given slip-speed when operating at constant flux. [8+8]
3. A class-A chopper, operating in time-ratio control, is supplying the armature of the separately excited dc motor. Show that the motor speed-torque relationship is $\omega_m = \frac{\delta V}{K} - \frac{R_a}{K^2} T_a$, Where V - chopper input voltage, R_a - Armature resistance, T_a - motor torque, K- torque constant. [16]
4. Draw the block diagram of a closed loop synchronous motor drive fed from VSI and explain. [16]
5. How is the output voltage of a VSI improved by PWM techniques? Explain how you will use this converter for speed control of a synchronous motor. [16]
6. (a) For stator voltage control scheme of a 3-phase Induction motor discuss about speed range, regeneration, harmonics, torque pulsating, power factor, cost, efficiency and applications.
 (b) Draw a block schematic diagram for automatic speed control of 3 phase cage Induction motor using solid state AC Voltage Controller on stator side. [8+8]
7. (a) With neat circuit diagram and waveforms, explain dynamic braking of separately excited motor by single phase converter.
 (b) A dc shunt motor has the armature resistance of 0.04Ω and the field winding resistance of 10Ω . Motor is coupled to an over hauling load with a torque of 400N-m. Following magnetization curve was measured at 600 rpm:

Field Current, A	2.5	5	7.5	10	12.5	15	17.5	20	22.5	25
Back emf, v	25	50	73.5	90	102.5	110	116	121	125	129

Calculate the value of R_B when the motor is required to hold overhauling load at 1200rpm. [8+8]

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Set No. 3

8. (a) Draw and explain a closed loop operation for a static Kramer controlled drive.
(b) In which way a static Kramer Control is different from static Scherbius drive? [10+6]

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