C 62993 (Pages : 2) Name.....

Reg. No.....

SEVENTH SEMESTER B.TECH. (ENGINEERING) DEGREE [SUPPLEMENTARY] EXAMINATION, APRIL 2014

(2009 Scheme)

PT 09 702 – ELECTRICAL DRIVES AND CONTROLS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

1. Explain SCR as a switch.
2. Mention the basic types of electrical drives.
3. What is meant by intermittent loading?
4. Write the speed equation of a d.c. motor?
5. How is chopper used in speed control of d.c. motor?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

1. Explain the construction, principle of operating, characteristics and applications of power transistors.
2. Explain the components of load torques and draw the characteristics of the variation of friction torque with speed.
3. What are the advantages of Electric drives?
4. What are the similarities between brush less d.c. motor and a self controlled motor drive?
5. Write a short notes on self-controlled synchronous motor drive.
6. Why a self-controlled synchronous motor is free from hunting oscillations?

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*

1. (a) Explain the working of *n*-channel enhancement type MOSFET.

Or

(b) What are the different methods of turning off an SCR? Explain all methods in detail.

Turn over

2. (a) Explain the thermal model of an electric motor for heating and cooling .What are continuous, short time and intermittent duties in terms of drives?

Or

(b) Explain the transient stability of an electric drive. How is it improved? What is the role of load equalization in the performance of an electric drive?

3. (a) State and explain the important features of various braking methods of d.c. motors.

Or

(b) What are the differences between the rectifier control of a d.c. shunt and d.c. series motors? What are the advantages of dual converters in electric drives?

4. (a) Explain the different methods of speed control of induction motor.

Or

(b) Discuss about variable frequency operation of synchronous motors.

(4 × 10 = 40 marks)

C 80776 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (09 SCHEME) (ENGINEERING) DEGREE EXAMINATION, APRIL 2015

EE/PTEE 09 604—ELECTRIC DRIVES

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

1. State the essential parts of an electric drive.
2. What is meant by steady-state stability of a drive ?
3. Draw the torque-speed characteristics of a separately excited d.c. motor during dynamic braking.
4. List the methods of speed control of a single-phase induction motor.
5. What you mean by microsteping in a stepper motor ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

6. Explain how a phase locked loop (PLL) is employed for speed control.
7. A 230 V, 960 r.p.m., 200 A separately excited d.c. motor has an armature resistance of 0.02 Ω. The motor is fed from a chopper which provides both motoring and braking operations. The source has a voltage of 230 V. Assuming continuous conduction, calculate the duty ratio of chopper from motoring and braking operation at rated torque and 350 rpm.
8. Explain plugging operation of d.c. motors.
9. Compare Current Source Invertor (CSI) and Voltage Source Inverter (VSI) drives for an induction motor.
10. Explain static rotor resistance control of a three-phase induction motor.
11. Explain the operation of synchronous reluctance motor.

(4 × 5 = 20 marks)

Part C

12. Explain the components of load torque, with examples.

Or

13. Explain the steady-state and transient modes of operation of an electric drive.
14. Explain single-phase fully controlled rectifier control of d.c. separately excited motor in discontinuous conduction mode.

Or

Turn over

15. A fully controlled rectifier fed separately excited d.c. motor is required to operate in motoring and braking operations in the forward direction. What should be the switching arrangement ? Explain with neat sketches.

16. Explain direct vector control of a 3ϕ induction motor.

Or

17. Explain variable frequency control method of an induction motor, operating in below frequency mode and above frequency mode.

18. Explain current regualted VSI fed sinusoidal PMAC motor drive for servo application.

Or

19. Explain a brushless D.C. motor drive with relevant waveforms.

(4 × 10 = 40 marks)

C 61457 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, APRIL 2014

EE/PTEE 09 604—ELECTRIC DRIVES

(2009 Scheme)

[Regular/Supplementary/Improvement]

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Name one suitable motor for cranes, stating the reason.
2. Draw the typical speed torque curve of a fan type load.
3. What are the possible quadrants of operation of a semiconductor fed d.c. drive system ?
4. In Scherbins scheme of induction motor control, if the d.c. link current is doubled, how much the total copper loss P_{cr} will increase/decreases ?
5. Give any *two* applications of synchronous drives.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. A weight of 500 kg. is being lifted up to at a uniform speed of 1.5 m/s by a winch drive by a motor running at a speed of 1000 r.p.m. The moments of inertia of the motor and winch are 0.5 kg.-m.^{2} and 0.3 kg.-m.^{2} respectively. Calculate the motor torque and equivalent moment of inertia referred to the motor shaft. In the absence of weight, motor develops a torque of 100 N-m when running at 1000 r.p.m.
7. A drive has following parameters :

   $J = 10$ kg.-m.^{2}

   $T_M = 100 - 0.1$ N, N-m

   T_L (passive) = 0.05 N, N-m.

   Where N is the speed in r.p.m. Then find the steady-state speed.
8. Explain principle of operation of chopper-feed d.c. drives.
9. What are the advantages of a.c. drives over d.c. drives ?

Turn over

10. Describe the conventional Scherbins scheme of slip energy recovery and enumerate its drawback.

11. Explain the self-control mode of a synchronous motor.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. Explain the following control methods for an electric drive :

    (i) Closed loop torque control.

    (ii) Closed loop speed control.

    (iii) Closed loop position control.

Or

13. (a) Explain "steady-state stability" of an electric drive.

    (b) Explain multiquadrant operation of an electric drive.

14. Explain three-phase fully controlled rectifier control of d.c. separately excited motor.

Or

15. Explain the closed-loop control scheme for d.c. motor drive below and above the base speed.

16. Explain closed-loop current source invertor (CSI) control of a three-phase induction motor. How multiquadrant operation is achieved using this drive ?

Or

17. Explain the working of CSI controlled induction motor drive with neat sketch.

18. Explain the operation of 3ϕ brushless d.c. motor drive, with necessary waveforms.

Or

19. Describe the principle of operation of switched reluctance motor. What are the advantages of SRM over other a.c. drives ?

(4 × 10 = 40 marks)

D 2776

Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION DECEMBER 2009

PT 2K 505—ELECTRICAL DRIVES AND CONTROLS

Time : Three Hours

Maximum : 100 Marks

Answer **all** *questions from Question I.*

1. (a) What are the reasons for using load equalisation in an electrical drive ?

   (b) Explain what do you understand by steady-state stability. What is the main assumption ?

   (c) Describe relative merits and demerits of four quadrant de drives employing non-circulating and circulating current dual converters.

   (d) What factors limit the maximum speeds of field controlled d.c. motors ?

   (e) Why high current inrush occurs during open circuit transition in star-delta and auto-transformer starters of induction motors ?

   (f) What are the disadvantages of induction motor operation with unbalanced supply voltages ?

   (g) State and explain the roles of a damper winding in a synchronous motor.

   (h) How the operation of a synchronous motor shifts from motoring to regenerative braking ?

   (8 × 5 = 40 marks)

2. (a) Explain the method of determination of motor rating.

   Or

   (b) Discuss the condition for steady-state stability.

   (15 marks)

3. (a) Explain the chopper controlled d.c. drives with neat schematics.

   Or

   (b) Explain the construction of different types of d.c. motors.

   (15 marks)

4. (a) Explain the various methods of starting of induction motors.

   Or

   (b) Explain the process of slip power recovery in case of induction motors.

   (15 marks)

5. (a) Classify synchronous motors and explain any one of them.

   Or

   (b) Discuss variable frequency operation of synchronous motors.

   (15 marks)

[4 × 15 = 60 marks]

C 15874 (Pages : 2) Name.....

Reg. No.....

EIGHTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, MAY 2011

EE 04 802—INDUSTRIAL DRIVES

Time : Three Hours Maximum : 100 Marks

I. (a) Write short notes on motors employed for variable speed drives.

(b) What is the current satus of DC and AC drives ?

(c) What are the advantages and disadvantages of single phase full converter fed d.c. motor drives ?

(d) Write short note on electrical time constant and mechanical time constant of the d.c. motor.

(e) What are the various means for Speed Control of induction motors ?

(f) What is meant by Sub-Synchronous regeneration in wound rotor induction motor ?

(g) What is meant by Self Control of Synchronous motors ?

(h) What is a Pull-out torque of Synchronous motor ?

(8 × 5 = 40 marks)

II. (a) Write a brief note on the following : —

(i) Current limit control.

(ii) Closed loop torque control.

Or

(b) (i) Explain with neat sketch the load equalisation of electric drives. (10 marks)

(ii) Discuss the PLL control of electric drives. (5 marks)

III. (a) Explain the working of dual converter fed seperately excited d.c. motor drive. also, derive the speed torque relationship.

(15 marks)

Or

(b) Describe briefly the closed loop control scheme for d.c. motor drive with below and above base speed.

(15 marks)

Turn over

IV. (a) Describe the variable frequency control method of an induction motor also, explain operation for two different modes. (i) Operation below the rated frequency. (ii) Operation above the rated frequency.

(15 marks)

Or

(b) Explain with neat sketch the working of CSI controlled induction motor drive.

(15 marks)

V. (a) Draw and explain the black diagram of a self controlled synchronous motor fed from three phase inverter.

(15 marks)

Or

(b) Write short notes on the following : —

(i) CSI fed Synchronous motor drives. (15 marks)

(ii) Energy Conservation in electric drives. (15 marks)

D 9798 (Pages 2) Name.....

Reg. No.....

EIGHTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2010

PTEE 2K 801/EE 2K 802—INDUSTRIAL DRIVES

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

1. (a) Describe in detail in about fundamental Torque equation.

   (b) A drive has the following parameters T = 150–0. IN, N-*m* where N is the speed in rpm load Torque T1 = 100 N-m. Initially the drive is operating in steady state. The characteristics of the load torque are changed to T1 = – 100 N/m. Calculate initial and final equilibrium speeds.

   (c) Explain Four Quadrant drive with field current reversal.

   (d) A 220 V, 24 A, 100 r.p.m. separately excited D.C. motor has an armature resistance of motor is controlled by a chopper with frequently of 500 Hz and source voltage of 230 V. Calculate the duty ratio for 1.2 times rated torque and 500 rpm.

   (e) Why stator voltage control is suitable for speed control of induction fan and pump drives ?

   (f) Why single phase A.C. dynamic braking of a star connected induction motor with two lead connection is able to produce only a small braking torque ? Why is it necessary to guard against loose contact in three lead braking connection.

   (g) Draw the salient pole would field motor.

   (h) Bruchlers D.C. motor drive for Servo application.

   (8 × 5 = 40 marks)

2. (a) Describe in detail about speed torque convention and multiquadrant operation.

   Or

   (b) Explain the modes of operation of Electrical drives.

   (15 marks)

3. (a) Explain in detail about single phase half controlled Rectifier control of D.C. separately excited motor in both discontinuous and continuous conductions.

   Or

   (b) Explain Solar powered pump drives.

   (15 marks)

Turn over

4. (a) Explain variable frequency control of a Induction Motor.

Or

(b) Explain Slip recovery scheme.

(15 marks)

5. (a) A 6MW, 3 Phase, 11 kv,y connected 50hz (9 Heading) pf syn.motor has Ys = 9 ohm and Rs = 0 Rated field current is 50A. Machine is controlled by variable frequency control at control at constant (v/f) ratio up to the bare speed. Determine (i) Torque and field current for the rated armature current, 750 rpm and 8 leading point ; (ii) Armature current and power factor for half the rated motor torque, 1500 rpm and rated field current.

Or

(b) Describe the role of over current and overload protection in drive system. How are they implemented ?

(15 marks)

[4 × 15 = 60 marks]