

G 728

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Reg. No.....

Name.....

**B.TECH. DEGREE EXAMINATION, MAY 2014**

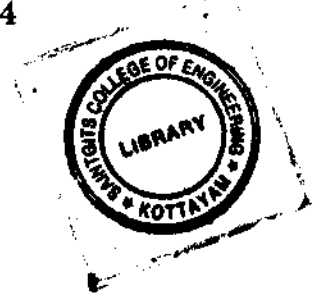
**Seventh Semester**

Branch : Electrical and Electronics Engineering

EE 010 703—DRIVES AND CONTROL (EE)

(Improvement/Supplementary)

[2010 Admissions]



Maximum : 100 Marks

Time : Three Hours

**Part A**

*Answer all questions briefly.*

*Each question carries 3 marks.*

1. Discuss about the classifications of load torque.
2. Draw the speed torque characteristics of a single-phase half controlled rectifier fed separately excited motor.
3. What are the features of variable frequency control ?
4. What is meant by slip power recovery scheme ?
5. What are the limitations of 25 kV AC traction using transformer with tap changer. (5 × 3 = 15 marks)

**Part B**

*Answer all questions.*

*Each question carries 5 marks.*

6. What are the components of load torque ?
7. Explain about the speed reversal carried out in the non-simultaneous control method of dual converter fed drive.
8. A three-phase 440 V, 1000 r.p.m. slip ring induction motor is operating with 4 % slip. Stator current is 30 A. Calculate the stator current if the speed of the motor is reduced to 500 r.p.m. using stator voltage control method.
9. Explain the dynamic braking of CSI fed drive.
10. Explain the principle of synchronous motor control. (5 × 5 = 25 marks)

**Turn over**

## Part C

Answer **all** questions.

Each full question carries 12 marks.

11. (a) Derive the equivalent values of drive parameters for a load undergoing rotational and translational motion.

(8 marks)

- (b) Derive the expression for fundamental torque.

(4 marks)

Or

12. With neat circuit diagram and relevant waveforms, explain the operation of single-phase half wave controlled rectifier fed d.c. separately excited motor.

13. With neat circuit diagram and relevant waveforms explain the operation of three-phase half controlled bridge rectifier fed d.c. motor drive.

Or

14. Explain the operation of chopper control of d.c. series motor.

15. Explain in detail about stator voltage control of induction motor drive.

Or

16. Explain in detail about the v/f control of induction motor drives.

17. (a) Discuss the principle of vector control.

(6 marks)

- (b) Briefly discuss about the slip speed control.

(6 marks)

Or

18. A 440 V, 50 Hz, 970 r.p.m., 6 pole, Y-connected 3-phase wound rotor induction motor has following parameters referred to the stator.  $R_s = 0.1 \Omega$ ,  $R_r' = 0.08 \Omega$ ,  $X_s = 0.3 \Omega$ ,  $X_r' = 0.4 \Omega$ . The stator to rotor turns ratio is 2. Motor speed is controlled by static Scherbius drive. Drive is designed for a speed range of 25% below the synchronous speed. Maximum value of firing angle is  $165^\circ$ . Calculate :

- (a) Transformer turns ratio.

- (b) Torque for a speed of 780 r.p.m. and  $\alpha = 140^\circ$ .

- (c) Firing angle for half the rated motor torque and speed of 800 r.p.m..

The d.c. link inductor has a resistance of  $0.01 \Omega$ .

19. Explain AC traction using PWM VSI squirrel cage induction motor drive.

Or

20. Explain in detail about the operation of VSI fed synchronous motor drive.

[5 × 12 = 60 marks]

