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Total Number of Pages : 02

M.TECH

AR-19

M.TECH 1ST SEMESTER EXAMINATIONS NOV/DEC 2019

Branch: PE, MPCPE1010

ELECTRIC DRIVE SYSTEM

Time: 3 Hours

Max Marks : 70

The figures in the right hand margin indicate marks.

PART-A

(10 X 2=20 MARKS)

1. Answer the following questions.

- a. What are the requirements of closed loop control of electric drives?
- b. Why a motor of smaller rating can be selected for a short time duty?
- c. How experimentally moment of inertia of a motor is determined?
- d. Why the slip power recovery scheme is suitable mainly for drives with low speed range?
- e. What is true synchronous mode of control in synchronous motor
- f. What are the functions of power modulator?
- g. Differentiate between active load torque and passive load torque.
- h. Which method of speed control of DC shunt motor is constant power drive method? Justify.
- i. What is stator voltage control of induction motor? Draw its characteristics.
- j. What is self-control mode of a synchronous motor drive?

PART-B

(5 X 10=50 MARKS)

Answer any five questions from the following.

2.
 - a) What is load equalization in an electrical drive? Derive the Expression for moment of inertia of the flywheel required for load equalization.
 - b) Derive the expression for motor speed and armature current for a separately excited DC motor with armature control under transient operation of starting.
3.
 - a) Explain the variable frequency control of an induction motor drive with suitable diagram and what is slip speed control?
 - b) What is slip power Recovery scheme? Explain static scherbius drive operation with suitable diagram and derive the expression of motor torque.
4.
 - a) Explain slip power recovery scheme using any one method.



- b) Define an electric drive. Explain in detail the operation and control of Ward-Leonard drive of DC motor.
- a) Describe relative merits and demerits of four quadrant dc drives employing non-circulating and circulating current dual converters.
- b) Explain the advantages and limitations of the 25 KV, 50 Hz ac traction using on-load transformer tap changer.
- 5.
- a) Derive the expression for Equivalent moment of inertia and Equivalent torque for a motor load system with loads having rotational and linear motion.
- b) Explain the closed loop speed control of electrical drive with suitable block diagram.
- 6.
- a) A constant speed motor have following dutycycle
- (i) Load rising linearly from 200 kw to 500 kw = 4 min
 - (ii) Uniform load of 400 kw = 2 min
 - (iii) Regenerative power returned to supply reducing linearly from 400 kw to 0 = 3 min
 - (iv) Remains idle for = 4 mins.
- Determine the power rating of the motor, assuming the loss to be proportional to (power)².
- (b) Draw and Explain Static Rotor Resistance control of Induction motor and mention its advantages & disadvantages.
- 7.
- a) Explain different types of electrical braking of DC series motor with suitable diagram and draw the speed torque characteristics under braking.
- b) A local train uses motor and trailer coaches in the ratio of 1:2. The weight of a motor coach is 40 tonnes and that of trailer 35 tonnes. All the wheels in the motor coach are driving wheels. The train resistance is 30 N/tonne. Effective rotating mass is 10% of the dead weight. If the coefficient of adhesion is 0.3, calculate (a) the maximum train acceleration on a level track. (b) What will be maximum acceleration if the motor and trailer coaches are used in the ratio of 1:1?

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