

Eighth Semester B.E. Degree Examination, Dec.08/Jan.09
Industrial Drives & Applications

Time: 3 hrs.

Max. Marks:100

Note : 1. Answer any FIVE full questions.

1.
 - a. What is a drive? How electric drives are advantageous over other types? (06 Marks)
 - b. Explain the modified Speed-torque characteristics of D.C. shunt motor with variation of armature current. (06 Marks)
 - c. Explain the different methods of speed control in Induction motor. (08 Marks)

2.
 - a. Explain the four quadrant operation for hoist drive system. State the assumptions made and conventions used. (10 Marks)
 - b. Explain clearly the speed-torque characteristics of Induction motor. Also explain the modified speed-torque characteristics (10 Marks)

3.
 - a. What are the advantages of electric braking? (04 Marks)
 - b. Explain different type of electric braking for D.C. shunt motors. (08 Marks)
 - c. A 200 V D.C. shunt motor takes full load $I_a=200$ A, $R_a=0.1 \Omega$ (ohms) is brake by plugging while running at 600 rpm. Calculate (1) The value of resistance to be placed in series with the armature to limit the initial current to 300 A. (2) Initial value of the braking torque. (3) Value of the braking torque when the speed has fallen to 300 rpm. (08 Marks)

4.
 - a. Assuming that the temperature increases according to an exponential law, show that $\theta = \theta_{\infty}(1 - e^{-t/\tau})$ where τ has the dimensions of time and is called heating time constant. Also derive the expression for cooling curve. (08 Marks)
 - b. Explain how the rating of a motor for continuous duty and variable load can be determined. (06 Marks)
 - c. Calculate the maximum overload that can be carried by a 25 KW motor, if the temperature rise is not to exceed 50°C after one hour on overload. The temperature rise on full load after one hour is 30°C and after 2 hours is 40°C . The losses vary as square of the load. (06 Marks)

5.
 - a. Explain how the paper is made in paper mill. Also write the types of drives employed for the same. (10 Marks)
 - b. Explain clearly the types of drives used in the cement industry. (10 Marks)

6.
 - a. Derive an expression for the equivalent load torque and equivalent moment of Inertia as referred to motor shaft of a motor-load combination where the load is fed through gear system (10 Marks)
 - b. Determine the equation of motion of the drive system consisting of a motor, a single gear train, an inertia torque, a hoist load, a dry friction load, a viscous friction load and a fan load as shown in Fig.6(b) (10 Marks)

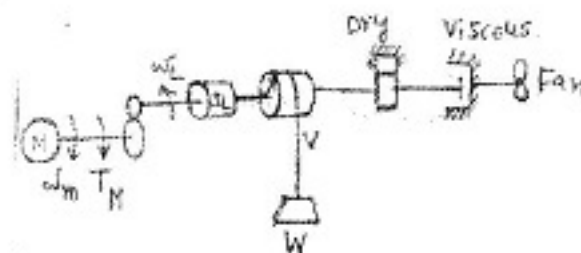


Fig.6(b)

- 7 a. Discuss the advantages and disadvantages of electric traction. (04 Marks)
- b. Write the factors affecting schedule speed. Also derive the relationship between principal quantities in speed time curve considering Trapezoidal Speed-time curve. (10 Marks)
- c. An electric train is to have a braking retardation of 3.2 Km/hr/sec. If the ratio of maximum speed to average speed is 1.3, the time for stop is 26 sec. and acceleration is 0.8 Km/hr/sec. Find its schedule speed for a run of 1.5 Km. Assume Trapezoidal speed-time curve. (06 Marks)
- 8 a. Write short notes on
- (i) Ward-Leonard method of speed control.
 - (ii) Suitability of D.C. series motor for traction.
 - (iii) Classification of electric drives.
 - (iv) Prove that $\frac{T}{T_{\max}} = \frac{2}{\frac{S}{S_{\max T}} + \frac{S_{\max T}}{S}}$ for induction machine
- (20 Marks)
