

Code No. OR23/PE

OR

JAWAHARLAL NEHRU TECHNOLOGY UNIVERSITY, HYDERABAD
M .Tech. II Semester Supplementary Examinations, March – 200
ELECTRIC TRACTION DRIVES
(Power Electronics)

Time: 3 hours

Max. Marks.60

Answer any Five questions
All questions carry equal marks

- 1.a) What are the requirements of an ideal traction system?
b) What are the advantages and disadvantages of electric traction?
- 2.a) Though A.C. is superior to D.C. for electric drives, sometimes D.C. is preferred. Give the reasons and mention some of the applications.
b) A.D.C. series motor drives a load, the torque of which varies as the square of the speed. The motor takes current of 30 amps, when the speed is 600 r.p.m. Determine the speed and current when the field winding is shunted by a diverter, the resistance of which is 1.5 times that of the field winding. The losses may be neglected.
- 3.a) What are the various electric traction systems in India? Compare them.
b) Give the features of various motors used in electric traction.
4. State the condition under which regenerative braking with D.C. services motor is possible and with the aid of diagrams of connection, explain the various methods of providing regeneration.
- 5.a) Draw the speed-time curve of a suburban service train and explain.
b) A train accelerates to a speed of 48km/hr in 24sec. Then it coasts for 69sec under a constant resistance of 58 Newton/Tonne and brakes are applied at 3.3km/hr/sec in 11sec. calculate
i) the acceleration ii) the coasting retardation iii) the scheduled speed if station stoppage is 20secs. What is the effect of scheduled speed if station stoppage is reduced to 15sec duration, other conditions remaining same? Allow 10% for rotational inertia.
- 6.a) Derive an expression for specific energy on level track using a simplified speed-time curve. What purpose is achieved by this quantity?
b) A 400 Tonne goods train is to be hauled by a locomotive up a gradient of 2% with acceleration of 1km/sec, coefficient of adhesion 20%, track resistance 40newtons/tonne and effective rotating masses 10% of the dead weight. Find the weight of the locomotive and the number of axles if the axle load is not to increase beyond 22 Tonnes.

Contd.....2

- 7.a) For a trapezoidal speed-time curve of an electric train, derive expression for maximum speed and distance between stops.
- b) A mail is to be run between two station 5kms apart at an average speed of 50km/hr. If the maximum speed is to be limited to 70km/hr, acceleration to 2km/hr/sec, braking retardation to 4km/hr/sec and coasting retardation to 0.1km/hr/sec, determine the speed at the end of coasting, during of coasting period and braking period.
8. Write short notes on the following:
- a) 25Kv A.C. traction using semi conductor converter controlled D.C. motors
- b) Chopper controlled D.C. traction using poly phase A.C. motor.

^***^