

TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
Model Question

Exam	Regular (New course)		
Level	BE	Full Marks	60
Programme	BEL	Pass Marks	24
Year/Part	III/II	Time	3 hr.

Subject: Electrical Drives (ENEE 353)

Attempt **All** questions

Q N	Questions	Marks	Chapter No.
1	a) Compare open-loop and closed-loop drive control systems	4	1
	b) Compare between individual, group, and multi-motor drives with applications.	3	
	c) What are the major components of an electric drive system?	3	
2	a) A horizontal belt conveyor moving at a uniform speed of 1.6 m/s transports material at a rate of 135 tons per hour. The conveyor belt is 240 m long and is driven by an electric motor operating at 1440 rpm.	6	2
	a) The load inertia referred to the motor shaft.		
	b) The motor torque required to accelerate the belt from rest to its full speed in 10 seconds, assuming that the moment of inertia of the motor is $0.12 \text{ kg}\cdot\text{m}^2$		
	b) Explain the Ward-Leonard system of speed control with a diagram. Also state the advantages and disadvantages of this method.	4	3
3	a) Explain the common methods of electric braking applied in dc motor's drives.	4	3
	b) A three-phase half-controlled thyristor bridge supplied from a 400 V, 3-phase, 50 Hz source feeds the armature of a separately excited DC motor, whose field winding is supplied with a constant voltage. The armature resistance is 0.2Ω , the rated armature current is 100 A, and the back EMF constant is 0.25 V/rpm . Determine the no-load speed if the no-load armature current is 5 A and the firing angle is 45° . Also determine the firing angle required to obtain a speed of 1500 rpm at rated armature current.	6	3
4	a) A 400 V, 4-pole, 50 Hz, 3-phase star-connected induction motor has the following parameters: number of stator turns per phase is twice the number of rotor turns per phase, $R_1=0.64 \Omega$, $X_1=0.8 \Omega$, $R_2=1.1 \Omega$, and $X_2=0.12 \Omega$. The load torque is proportional to the square of speed and is $40 \text{ N}\cdot\text{m}$ at 1440 rpm. If the motor speed is 1300 rpm, find: (i) Load torque (ii) Rotor current (iii) Stator applied voltage	5	4
	b) Explain the principle of V/F control and discuss its advantages and applications.	4	4

5	a) Why is the slip power recovery method more efficient than the conventional rotor resistance control method?	4	4
	b) Compare ac and dc traction system.	3	5
	c) Explain the layout and key components of a modern AC power supply system for electric traction	4	5
6	a) An electric train is to have acceleration and braking retardation of 0.8km/h/s and 3.2 km/h/s respectively. If the ratio of maximum to average speed is 1.3 and time for stops 26s, find schedule speed for a run of 1.5km. Assume simplified trapezoidal speed time curve.	6	5
	b) What are the primary factors that must be considered while selecting an electric drive for a specific industrial application?	4	6