000249

PRN:		Course Code :	ELE2602

Second Year **B. Tech** End Semester Examination Winter 2024

Electrical Drives

Day and Date: Thu/2 1 NOV 2024 Max Marks: **100**

Time : 02:00PM To 05:00PM Duration: **03** hrs

Instructions: All questions are compulsory.

Q.1	**Attempt the following**	Marks	Bloom's Level	CO
a)	Obtain the equilibrium point and determine their steady state stability when the motor and load torque are as follows: $T_M = -1 - 2\omega_m$ and $T_l = -3\sqrt{\omega_m}$	08	L_3	CO1
b)	Fig. 1 shows the torque versus speed characteristics of Motor (T) and load T_L. Apply the stability condition and evaluate the stability with respect to equilibrium point A and B.	08	L_3	CO1

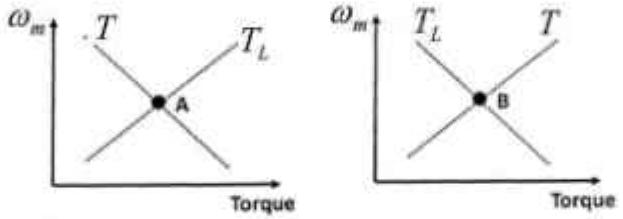


Figure 1: Torque Versus Speed Characteristics

OR

b)		08	L_3	CO1

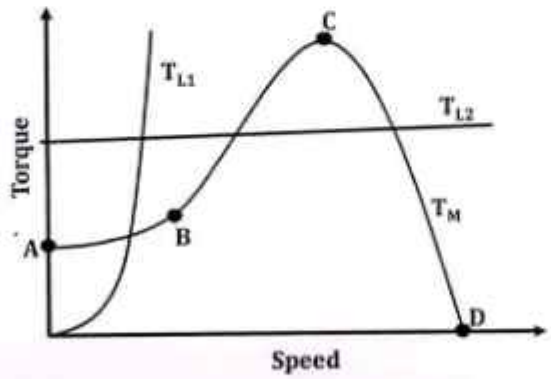


Figure 2: Torque Vs Speed Characteristic of Motor & Loads

Fig. 2 shows the speed versus torque characteristics of Motor (TM), the load characteristics T_{L1} and T_{L2}. The operating regions are AB, BC and CD. Apply the stability in the equilibrium conditions and detail the stability of the operating points between the regions AB, BC and CD.

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Q.2 **Attempt the following**

a)	Explain with suitable waveforms when we apply firing angle control in semi converter fed DC motor, what are all the variations in output voltage, current in both continuous and discontinuous conduction. Also derive the speed equation in terms of firing angle during continuous conduction?	08	L_3	CO2
b)	A 200 V, 875 rpm, 150 A separately excited DC Motor has an armature resistance of 0.06 Ohm. It is fed from a single phase fully controlled rectifier with an AC source voltage of 220 V, 50 Hz. Assume continuous conduction. 1. Calculate the firing angle for the rated motor torque and speed 750 rpm. 2. Calculate motor speed for the firing angle 160 degree and rated torque?	08	L_3	CO2

OR

b)	A 230 V, 960 rpm and 200 A separately excited DC Motor has an armature resistance of 0.02 Ohm. The motor is fed from a chopper which provides both motoring and braking operations. The source has a voltage of 230 V. Assume continuous conduction. 1. Calculate duty ratio of chopper for motoring operation at rated torque and speed 350 rpm. 2. Calculate duty ratio of chopper for braking operation at rated torque and speed 350 rpm	08	L_3	CO2

Q.3 **Attempt any two from the following**

a)	Draw the detailed block diagram and explain the concept of Variable Voltage Variable Frequency Control in Induction Motor Control?	08	L_2	CO3
b)	With suitable derivation explain the possibilities of variable frequency control and write the limitations of variable frequency control when reduce the frequency and increase the same?	08	L_2	CO3
c)	With suitable derivation explain the possibilities of variable voltage control and write the limitations of variable voltage control?	08	L_2	CO3

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Q.4	**Attempt any two from the following**				
	a)	Explain the operation of self-controlled mode of synchronous motor with suitable block diagram?	08	L_2	CO3
	b)	With suitable block diagram explain the operation of voltage source inverter fed synchronous motor drive?	08	L_2	CO3
	c)	Detail the operation of load commutated inverter fed synchronous motor drive?	08	L_2	CO3
Q.5	**Attempt any Two of the following**				
	a)	Draw the suitable block diagram and explain the operation of Universal Motor Control?	09	L_2	CO4
	b)	Draw the suitable block diagram and explain the operation of Brush Less DC Motor Control?	09	L_2	CO4
	c)	With suitable block diagram explain the operation of Stepper Motor Control?	09	L_2	CO4
Q.6	**Attempt any Two of the following**				
	a)	With detailed block diagram, explain the operation of solar powered Pump Drive?	09	L_2	CO5
	b)	Differentiate the types of Steel Rolling Mills?	09	L_2	CO5
	c)	Compare armature and field control of DC Motor in Electric Vehicle application with suitable diagrams?	09	L_2	CO5

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