CLASS: BTECH   SEMESTER : VII
BRANCH: EEE   SESSION : MO/2024

SUBJECT: EE437 INDUSTRIAL DRIVES AND CONTROL

TIME: 02 Hours   FULL MARKS: 25

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates

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			CO	BL
Q.1(a)	Draw the block diagram of an electrical drive. Explain each function of the drive block system	[2]	1	2
Q.1(b)	Classify different types of load torques. Interpret the nature of each load torque	[3]	1	2
Q.2(a)	Derive the expression for moment of inertia and load torque of a system of loads with translational motion interconnected with motor-load system in rotational motion. Moment of inertia of motor coupled with rotational motion load be J_0, load torque directly coupled to the motor be T_{l0}, mass, velocity and force of load under translational motion be M_1 kg, V_1 m/s, and F_1 N.	[2]	2	3
Q.2(b)	A motor has two loads. One has rotational motion. It is coupled to the motor through a reduction gear with a = 0.1 and efficiency of 90%. The load has moment of inertia of 10Kgm^2 and a torque of 10 Nm. Other load has translational motion and consists of 1000Kg weight to lifted up to a uniform speed of 1.5m/s. Coupling between this load and the motor has efficiency of 85%. Motor has an inertia of 0.2kgm^2. And runs at a constant speed of 1420 rpm. Determine equivalent inertia referred to the motor shaft and torque developed by the motor.	[3]	2	3
Q.3(a)	Obtain the thermal model of a motor for temperature rise of the system	[2]	2	3
Q.3(b)	A motor operates on a periodic duty cycle in which it is clutched to its load for 10 min and declutched to run on no-load for 20 min. minimum temperature rise is 40ºC. Heating and cooling time constants are equal and have a value of 60 min. When the load is declutched continuously the temperature rise is 15ºC. Determine i) maximum temperature during the duty cycle, and ii) temperature when the load is clutched continuously.	[3]	2	3
Q.4(a)	A constant speed drive has the following duty cycle; (i)Load rising from 0 to 400kW : 5 min (ii)Uniform load of 500kW : 5 min. (iii) Regenerative power of 400kW returned to the supply : 4 min (iv) Remains idle for : 2 min Estimate the power rating of the motor. Assume the losses to be proportional to (power)^2	[2]	2	3
Q.4(b)	Classify different classes of motor duty with a suitable diagram of each motor duty	[3]	2	3
Q.5(a)	Analyze the performance characteristic of the DC motor using speed-torque characteristics and torque-armature current characteristics	[2]	3	
Q.5(b)	A 200 V, 10.5 A, 2000 rpm shunt motor has the armature and field resistance of 0.5 and 400 Ω respectively. It drives a load whose torque is constant at rated motor torque. Calculation motor speed if source voltage drops to 175 V.	[3]	3	4

::::::18/09/2024::::::M