Register Number:……..

KUMARAGURU college of technology
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B.E/B.TECH DEGREE EXAMINATIONS: APRIL/MAY 2024

(Regulation 2018)

Sixth Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

U18EEI6204**:** Solid State Drives

COURSE OUTCOMES

CO1: Compare various types of loads, quadrants of operation and characteristics of motors.

CO2: Design power converter circuits for DC and AC motor drives.

CO3: Describe the speed control schemes for DC and AC motor drives.

CO4: Choose the motor drives for appropriate applications.

CO5: Simulate AC and DC drive circuits using software tool.

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

1.	Identify the elements of electric drive system.	CO1	[K_1]
2.	Classify electrical braking of drives.	CO1	[K_2]
3.	A 200 V, 25 A, 1000 rpm separately excited DC motor is fed from single phase half-controlled converter and driving a constant torque load. Calculate the converter output volage required to operate the motor at 500 rpm. Armature voltage drop is negligible.	CO4	[K_3]
4.	Construct three phase AC- DC converter circuit for 2 MW separately excited DC motor to operate in forward and reverse directions.	CO2	[K_3]
5.	Draw the circuit of DC- DC converter working in quadrants 1 and 3 to operate separately excited DC motor.	CO2	[K_3]
6.	A DC motor requires 60V input to the armature which is supplied from a DC-DC boost converter. Calculate the duty cycle of the boost converter with an input of 36 V from a battery.	CO5	[K_3]
7.	Draw the block diagram for constant V/f control of three phase induction motor.	CO3	[K_2]
8.	State the objective of vector control of three phase induction motor.	CO3	[K_3]
9.	Identify the applications of synchronous motor drives.	CO4	[K_2]
10.	List the simulation tools for electrical drives.	CO5	[K_2]

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11.	a)	(i) Describe acceleration, steady state operation and deceleration of electrical drives using torque balance equation.	(4)	CO1	[K_2]
		(ii) Classify the loads with respect to speed- torque characteristics.	(4)		
	b)	Illustrate the classes of motor duty with load curve and temperature curve.	(8)	CO1	[K_2]
12.	a)	Compare the circuits and operation of DC motor drives using single phase half-controlled converter and single phase fully controlled converter.	(8)	CO2	[K2]
	b)	Describe the circuit and waveforms of three phase fully controlled converter fed separately excited DC motor for continuous current mode.	(8)	CO2	[K_3]
13.	a)	With circuit diagram, explain the regenerative braking operation of DC motor using DC- DC boost converter.	(6)	CO3	[K_2]
	b)	Describe the circuit and operation of four quadrant chopper fed separately excited DC motor.	(10)	CO2	[K_2]
14.	a)	Compare VSI fed induction motor drive and CSI fed induction motor drive.	(6)	CO2	[K_2]
	b)	Describe the static method of rotor resistance control for three phase induction motor. If the external resistance is 8 Ω, internal rotor resistance is 3 Ω/ phase and duty cycle of control circuit is 0.5, calculate the effective value of resistance per phase in rotor circuit.	(10)	CO3	[K_3]
15.	a)	Illustrate a static method of slip power recovery for three phase slip ring induction motor.	(8)	CO2	[K_2]
	b)	Describe the self- control method of synchronous motor drive using load commutated inverter.	(8)	CO3	[K_2]
16.	a)	Draw the block diagram of electric two-wheeler motor drive and explain the circuit for bipolar drive operation.	(10)	CO4	[K_2]
	b)	Describe the process of paper mill and selection of drives.	(6)	CO4	[K_2]

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