KUMARAGURU
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B.E/B.TECH DEGREE EXAMINATIONS: NOV/DEC 2023

(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.	Mention different types of classes of Duty.	CO1	[K_2]
2.	Write the fundamental torque equation for dynamic electric drives.	CO1	[K_2]
3.	Write the functions of a freewheeling diode in a phase controlled rectifier.	CO2	[K_3]
4.	List out the advantages of three phase controlled DC drives over single phase controlled DC drives.	CO2	[K_3]
5.	Mention the various control strategies for varying duty cycle of the chopper.	CO3	[K_3]
6.	Thyristors are not preferred in chopper fed DC drives. Why?	CO3	[K_3]
7.	Mention the three regions in the speed-torque characteristics of the three phase induction motor.	CO4	[K_2]
8.	Define slip power.	CO4	[K_2]
9.	List any two applications of synchronous motor drives.	CO4	[K_2]
10.	Which machine is said to be self-controlled?	CO3	[K_2]

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

11.	a)	Explain in detail about multi quadrant operations of drive.	8	CO1	[K_2]
	b)	Explain different classifications of load torque and explain the typical load torque characteristics of electric drives.	8	CO1	[K_2]

12. a) Derive the expression for critical speed which separates the continuous conduction mode from discontinuous conduction mode of operation of single phase fully controlled rectifier for separately excited DC motor.   16   CO2   [K₃]

13. a) Explain the operation of 2 quadrant and 4 quadrant chopper fed DC drive system.   10   CO3   [K₃]

   b) The chopper used for on-off control of a dc separately excited motor has supply voltage of 230V dc, an on-time of 10 msec and off-time of 15 msec. Neglecting armature inductance and assuming continuous conduction of motor current, Calculate the average load current when the motor speed is 1500 rpm and has a voltage constant K_v=0.5V/rad per sec. The armature resistance is 3Ω.   6   CO3   [K₃]

14. a) Explain the closed loop control of three phase induction motor drives with constant V/f control strategy in detail with relevant block diagram.   16   CO4   [K₂]

15. a) Draw and explain the slip power recovery scheme applicable for 3 phase slip ring induction motor.   16   CO4   [K₂]

16. a) Explain the construction and operation of BLDC motor drive in detail.   16   CO3   [K₂]

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