M.E. / M.Tech. - DEGREE EXAMINATIONS, APRIL/MAY 2023

Second Semester

M.E. – Power Electronics and Drives

20PPEPC202 – SOLID STATE DC DRIVES

(Regulations 2020)

Duration: 3 Hours

Max. Marks: 100

PART - A (10 × 2 = 20 Marks)
Answer ALL Questions

		Marks, K-Level,CO
1.	Compare the constant torque and constant power operation of the DC motor	2,K2,CO1
2.	Draw the speed -torque characteristics of DC motor.	2,K2,CO1
3.	Write the importance of freewheeling diode in the converter circuits.	2,K1,CO2
4.	How to implement braking in DC controlled drives?	2,K2,CO2
5.	Draw the diagram of class E chopper controlled drive.	2,K2,CO3
6.	List the applications of Chopper fed DC drives.	2,K1,CO3
7.	Write the key considerations when modeling the power converters using a linear transfer function approach.	2,K1,CO4
8.	Enlist the sensing and feedback elements used in the DC drives.	2,K1,CO4
9.	Compare the performance of a micro-computer controlled DC drive using a Phase Locked Loop with a traditional analog control system.	2,K2,CO5
10.	Write the disadvantages of analog control of electrical drives.	2,K1,CO5

PART - B (5 × 13 = 65 Marks)
Answer ALL Questions

11.	a)	Explain any two methods of speed control in DC motor.	13,K2,CO1
		OR	
	b)	Explain Constant torque operation of DC motor.	13,K2,CO1

12. a) (i) A separately excited dc motor operating from a single phase half controlled bridge at a speed of 1400rpm has an input voltage of 330sin314t and a back emf of 80v. The SCRs are fired symmetrically at α=30 in every half cycle. The armature has a resistance of 4Ω. Calculate the average armature current and the motor torque.   *6,K2,CO2*

(ii) Explain the different power factor improvement methods in single phase converters   *7,K2,CO2*

OR

b) Explain the motor performance parameters and input supply performance parameters of Single Phase DC Drives. — *13,K2,CO2*

13. a) Explain the non-circulating current and circulating current mode of operation of Three phase Dual converters. — *13,K2,CO3*

OR

b) Explain the operation of class D chopper controlled DC Separately excited motor with waveforms. — *13,K2,CO3*

14. a) Explain in detail the design of current controller of closed loop control system of dc separately excited dc motor. — *13,K2,CO4*

OR

b) How does the simulation of a chopper-fed DC drive differ from a converter-fed DC drive, and what are the specific challenges involved. — *13,K2,CO4*

15. a) Explain with a program flow chart the load distributed operation micro computer control of dc drive. — *13,K2,CO5*

OR

b) Explain the phase locked loop control of DC drives with program and flowchart for constant horse power operation. — *13,K2,CO5*

PART - C (1 × 15 = 15 Marks)

16. a) Compare different current sensing techniques, such as shunt resistors, Hall effect sensors, and current transformers. Evaluate their advantages, disadvantages, and suitability for different motor types. — *15,K3,CO5*

OR

b) Design a micro-computer control system for a DC drive using a Phase Locked Loop. Consider the specifications such as speed regulation, torque control, and response time. — *15,K3,CO5*