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Question Paper Code	12614
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**B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2024**

Sixth Semester

**Electrical and Electronics Engineering**

**20EPC601 - SOLID STATE DRIVES AND CONTROL**

Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

**PART - A (10 × 2 = 20 Marks)**

Answer ALL Questions

	Marks	K-Level	CO
1. Outline the basic block diagram of electric drive.	2	K2	CO1
2. Define active load torque.	2	K1	CO1
3. Can a semi converter fed DC drive operated in quadrant IV? Justify your answer.	2	K2	CO2
4. Classify the different control strategies used in chopper.	2	K2	CO2
5. List the different types of slip power recovery systems.	2	K1	CO3
6. Compare CSI fed drives and VSI fed drives.	2	K2	CO3
7. Distinguish self and separate control modes.	2	K2	CO4
8. What are the advantages of constant margin angle control of synchronous motor drive fed by an inverter?	2	K1	CO4
9. Summarize the advantages of closed loop speed control.	2	K2	CO5
10. Write the transfer function of the converter.	2	K2	CO5

**PART - B (5 × 13 = 65 Marks)**

Answer ALL Questions

11. a) Explain and derive an equation to find out equivalent Load torque in a motor load system with translational and rotational motion.	13	K2	CO1
<b>OR</b>			
b) i) Explain the multi-quadrant operation of hoist drive with neat diagram.	8	K2	CO1
ii) Describe the equation governing motor load dynamics of drive.	5	K2	CO1
12. a) Explain the steady state analysis of single phase fully controlled rectifier fed dc drive for motoring and braking operation for a discontinuous mode with relevant waveforms and characteristics.	13	K2	CO2
<b>OR</b>			
b) i) Explain the operation of three phase dual converter fed DC drives.	6	K2	CO2
ii) Explain the operation of motoring control in chopper fed separately excited dc motor with its speed torque curves.	7	K2	CO2

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

**12614**

13. a) i) Elaborate on the operational principles behind the static Scherbius drive. 8 K2 CO3  
ii) Compare the static Kramer and Scherbius system. 5 K2 CO3

**OR**

- b) Describe the closed loop control speed control of voltage source fed induction motor drive. 13 K2 CO3
14. a) Explain the operation of a 'power margin control' based self controlled synchronous motor drive. 13 K2 CO4
- OR**
- b) Explain the construction and working of permanent magnet synchronous motor drive. 13 K2 CO4

15. a) Write short notes on:-  
i) Converter selection and characteristics. 7 K2 CO5  
ii) Field weakening mode control. 6 K2 CO5

**OR**

- b) Derive the transfer function of the dc motor load system and power converter. 13 K2 CO5

**PART - C (1 × 15 = 15 Marks)**

16. a) Derive the closed loop speed control of separately excited DC motor by proportional Controller. 15 K2 CO5
- OR**
- b) Interpret the closed loop operation of permanent magnet synchronous motor drive. 15 K2 CO4