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Question Paper Code	11566
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B.E./B.Tech. - DEGREE EXAMINATIONS, NOV/DEC 2022

Sixth Semester

Electrical and Electronics Engineering

EE8601 - SOLID STATE DRIVES

(Regulations 2017)

Duration: 3 Hours

Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

- | | <i>Marks,
K-Level,CO</i> |
|--|------------------------------|
| 1. List the advantages of electrical drives. | 2,K1,CO1 |
| 2. Define active Load torque. | 2,K1,CO1 |
| 3. List the drawbacks of AC-DC Converter (rectifier) fed DC drives. | 2,K1,CO1 |
| 4. Can a semi converter fed DC drive operate in quadrant IV? Justify your answer. | 2,K2,CO1 |
| 5. Why induction motors are suitable for pump type and fan type loads? | 2,K2,CO1 |
| 6. Sketch the speed torque characteristics of induction motor. Infer the modes of operation along with torque and power limit. | 2,K1,CO1 |
| 7. Write down the torque equation of synchronous motor. | 2,K1,CO1 |
| 8. Compare VSI and CSI fed synchronous motor drive. | 2,K2,CO1 |
| 9. List the advantages of closed loop control system in electric drives. | 2,K1,CO1 |
| 10. Explain armature voltage control. | 2,K1,CO1 |

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11. a) Draw the block diagram of solid state drive and explain the functions of essential parts. 13,K2,CO1

OR

- b) Explain in detail about the multi-quadrant dynamics in the Speed – Torque plane with an example. 13,K2,CO1

12. a) Explain with necessary waveforms and equations of the single phase fully controlled converter fed separately excited DC motor drive in continuous conduction mode. 13,K2,CO2

OR

- b) Explain the operation of four quadrant operation of chopper fed DC separately excited motor drive with necessary diagram. 13,K2,CO2

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

11566

13. a) Explain the principle of V/f control for induction motor drives. 13,K2,CO3

OR

b) With neat sketch explain the slip power recovery schemes of induction motor. 13,K2,CO3

14. a) Explain in detail, the open loop control of synchronous motor with constant V/f ratio. 13,K2,CO4

OR

b) Explain the closed loop control of synchronous motor with neat block diagram. 13,K2,CO4

15. a) Derive the transfer function of DC motor – load system with converter fed system. 13,K3,CO5

OR

b) Write short notes on

(i) Converter selection and characteristics. 7,K2,CO5

(ii) Field weakening mode control. 6,K2,CO5

PART - C (1 × 15 = 15 Marks)

16. a) Give the design procedure for current controller and speed controller. 15,K3,CO5

OR

b) A motor drives two loads. One has rotational Motion. It is coupled to the motor through a reduction gear with a gear tooth ratio of 0.1 and efficiency of 90%. The load has a moment of inertia of 10 kg-m² and a torque of 10 N-m. Other load has translational motion and consists of 1000kg weight to be lifted up at a uniform speed of 1.5 m/s. Coupling between this load and the motor has an efficiency of 85%. Motor has inertia of 0.2 kg-m² and runs at a constant speed of 1420 rpm. Determine equivalent inertia referred to the motor shaft and power developed by the motor. 15,K3,CO1