

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIRST SEMESTER M.TECH DEGREE EXAMINATION, APR 2021

Branch: ELECTRICAL & ELECTRONICS ENGINEERING

Stream(s): POWER ELECTRONICS AND DRIVES

Course Code & Name: 01EE6901: DC MOTOR DRIVES

Answer *any two full* questions from *each* part

Limit answers to the required points.

Max. Marks: 60

Duration: 3 hours

PART A

1. a) State the essential parts of an electric drive. Explain the function of each block with the help of a block diagram. (6)
b) What are the different components of load torque? (3)
2. a) Explain the 4-quadrant operation of an electric drive considering hoist as an example. (6)
b) What are the main factors which decide the choice of an electric drive for a particular application? (3)
3. Derive the equation for the load torque of a motor-load system which drives a load directly coupled to the shaft and another load through a gear with “n” and “n₁” teeth. (9)

PART B

4. Derive the transfer function of a separately excited DC motor. (9)
5. With the help of a neat circuit diagram and waveforms explain the operation of a single phase fully controlled rectifier fed separately excited DC motor. (9)
6. Explain the different methods of speed control employed in an electric drive. (9)

PART C

7. Explain with the help of a neat diagram the operation of a 4-quadrant chopper fed separately excited DC motor drive. (12)
8. a) Explain in detail the closed loop speed control of a DC motor. (6)
b) Why is current sensing required in electric drives? What are the common methods of current sensing? (6)
9. a) What are the limitations of DC drives? (3)
b) Compare converter fed DC drives and chopper fed DC drives. (6)
c) Explain with the help of a block diagram the current limit control in DC drives. (3)

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