

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV/ DEC 2025
 Sixth Semester
Electrical and Electronics Engineering
20EPC601 - SOLID STATE DRIVES AND CONTROL
 Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

	<i>Marks</i>	<i>K - Level</i>	<i>CO</i>
1. The selection of an electric motor for any application depends on which of the following factors	1	K1	CO1
(a) Electrical characteristics			
(b) Mechanical characteristics			
(c) Size and rating of motors			
(d) All of the above			
2. Which of the following motors are preferred for over head travelling cranes?	1	K1	CO1
(a) Slow speed motors			
(b) Continuous duty motors			
(c) Short time rated motors			
(d) None of the above			
3. In case of a three phase full controlled converter with 6 SCRs, commutation occurs every	1	K1	CO2
(a) 120°			
(b) 60°			
(c) 180°			
(d) 30°			
4. How many quadrants does full-converter work?	1	K1	CO2
(a) One			
(b) Half			
(c) Two			
(d) Can be any			
5. Variable frequency control method is used in _____	1	K1	CO3
(a) Slip ring motor			
(b) Squirrel cage motor			
(c) Synchronous motor			
(d) Reluctance motor			
6. By decreasing the supply frequency at constant voltage, the value of air gap flux	1	K1	CO3
(a) Decreases			
(b) Increases			
(c) Zero			
(d) Neither increase nor decrease			
7. When the frequency value is less than the constant ratio of V/f, then motor is at _____ condition.	1	K1	CO4
(a) Under excitation			
(b) Normally excited			
(c) Full load			
(d) Over excitation			
8. How magnetic flux is distributed in air gap	1	K1	CO4
(a) Rectangular			
(b) Square			
(c) Sinusoidal or quasi sinusoidal			
(d) Triangular			
9. In field current controlled case, the motor torque _____ with respect to field current	1	K1	CO5
(a) Increases exponentially			
(b) Decreases exponentially			
(c) Increases linearly			
(d) Decreases linearly			
10. Higher the braking torque of the drive _____	1	K1	CO5
(a) greater is the deceleration			
(b) lesser is the deceleration			
(c) greater is the acceleration			
(d) greater is the starting current			

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

11. Relate the condition for steady state stability of the motor-load system.	2	K2	CO1
12. Infer the functions of power modulator.	2	K2	CO1
13. What is meant by dynamic braking?	2	K1	CO1
14. Illustrate time ratio control.	2	K2	CO2
15. Show the advantages in operating choppers at high frequency.	2	K2	CO2
16. List the drawbacks of converter fed dc motor drives.	2	K1	CO2
17. What are the features of variable frequency control?	2	K1	CO3
18. Recall the different types of slip power recovery systems.	2	K1	CO3
19. List out the commonly used synchronous motors.	2	K1	CO4
20. Outline the advantages and applications of PMSM.	2	K2	CO4
21. Summarize the advantages of brushless D.C. motor.	2	K2	CO5

22. Compare D.C. link converter and cyclo-converter. 2 K2 CO5

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23. a) Outline the main factors which decide the choice of an electrical drive for a given application. 11 K2 CO1

OR

b) A motor drives two loads, one has rotational motion. It is coupled to the motor through a reduction gear with $a=0.1$ and efficiency of 90%. The load has a moment of inertia of 10 Kg-m^2 and a torque of 10 Nm. The other load has translational motion and consists of 1000 kg weight to be lifted up at a uniform speed of 1.5m/s. coupling between this load and the motor has an efficiency of 85%. Motor has an inertia of 0.2 Kg-m^2 and runs at constant speed of 1420 rpm. Determine the equivalent inertia referred to the motor shaft and power delivered by the motor. 11 K2 CO1

24. a) Make use of the steady state analysis of single phase fully controlled rectifier fed DC drive for motoring and braking operation for a continuous mode with relevant waveforms and characteristics. 11 K3 CO2

OR

b) Develop the operation of four quadrant chopper dc separately excited motor drive with necessary diagrams. 11 K3 CO2

25. a) Illustrate the closed loop control of the static Kramer system with a neat diagram. 11 K2 CO3

OR

b) Make use of the v/f control technique utilized for speed regulation in induction motors, incorporating diagrams and waveform illustrations to enhance comprehension. 11 K2 CO3

26. a) Interpret the separate controlled mode of operation of synchronous motor . 11 K2 CO4

OR

b) Summarize the closed loop operation of permanent magnet synchronous motor drive. 11 K2 CO4

27. a) Summarize the transfer function of the dc motor load system and power converter. 11 K2 CO5

OR

b) Explain the closed loop speed control of separately excited DC motor by Proportional - Integral Controller. 11 K2 CO5

28. a) (i) Explain in short the working of permanent magnet synchronous motor drive. 6 K2 CO4

(ii) Summarize the Converter selection and characteristics. 5 K2 CO5

OR

b) (i) Discuss on self control technique in synchronous motor. 6 K2 CO4

(ii) Explain Field weakening mode control of DC motor. 5 K2 CO5