

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025

Sixth Semester

Electronics and Instrumentation Engineering

20EIPC603 - POWER ELECTRONICS, DRIVES AND CONTROL

Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

	Marks	K- Level	CO
1. For the high-frequency choppers, the device that is preferred is----- (a) TRIAC (b) Transistor (c) Thyristor (d) GTO	1	K1	CO1
2. The most suitable device for high frequency inversion in SMPS is (a) BJT (b) MOSFET (c) IGBT (d) SCR	1	K1	CO1
3. Calculate the power developed by motor using $E_b = 55V$ and $I = 6A$ (a) 220W (b) 330W (c) 440W (d) 500W	1	K2	CO2
4. In a single-phase full converter, if α and β are firing and extinction angles respectively, then the load current is discontinuous if (a) $(\beta - \alpha) < \pi$ (b) $(\beta - \alpha) > \pi$ (c) $(\beta - \alpha) = \pi$ (d) $(\beta - \alpha) = 3\pi/2$	1	K1	CO2
5. Buck converter is used to (a) step up voltage (b) step down voltage (c) step up and step down voltage (d) Equalize the voltage	1	K1	CO3
6. The principle of step up chopper can be employed for (a) Regenerative braking (b) Motoring (c) Plugging (d) reverse motoring	1	K1	CO3
7. Stator voltage control for speed control of induction motor is suitable for (a) Fan and Pump Drive (b) Drive of a crane (c) Running as the generator (d) Constant Load drive	1	K1	CO4
8. Speed control by variation of flux (a) Constant power drive (b) Constant torque drive (c) Variable power drive (d) None of above	1	K1	CO4
9. Find out the condition for steady state operation of a motor (a) Motor torque > Load torque (b) Motor torque < Load torque (c) Motor torque = Load torque (d) None of above	1	K1	CO5
10. Which one of the following can act as power modulator (a) Chopper (b) Inverter (c) Rectifier (d) All the above	1	K1	CO5

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

11. Define holding current.	2	K1	CO1
12. Define pinch off voltage of MOSFET.	2	K1	CO1
13. List the simulation tools for Power converters.	2	K1	CO1
14. Illustrate how to vary the firing angle.	2	K2	CO2
15. Discuss the functions of freewheeling diode.	2	K2	CO2
16. Illustrate the term sequence control of ac voltage regulators.	2	K2	CO2
17. Distinguish between time ratio control and current limit control employed in a DC chopper.	2	K2	CO3
18. Name the types of switching regulators.	2	K2	CO3
19. Differentiate between VSI and CSI.	2	K2	CO4
20. Recall the necessity of PWM for an inverter.	2	K1	CO4

21. Why V/F ratio is to be maintained as a constant? 2 K1 CO5
 22. Discuss the advantages of closed loop control. 2 K2 CO5

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23. a) Explain the V-I characteristics of SCR with neat waveforms. 11 K2 CO1
OR
 b) Discuss about the switching characteristics of IGBT with necessary waveforms. 11 K2 CO1
24. a) A single phase full converter is feeding a RLE load with the source voltage of 230 V the average load current is 10 A and $R=4\Omega$, $L=2\text{mH}$. Find the firing angle α for $E=120\text{V}$ and $E= (-120\text{V})$. 11 K2 CO2
OR
 b) With suitable diagram explain the operation of Single phase to single phase step up cycloconverter. 11 K2 CO2
25. a) Discuss the operation of a four quadrant chopper for a real time application. 11 K2 CO3
OR
 b) Discuss the operation of Boost converter and derive the expression for ripple voltage. 11 K2 CO3
26. a) Describe the operation of 3-phase voltage source inverter with 120° conduction mode. 11 K2 CO4
OR
 b) List the different PWM schemes and explain about the principle of operation of a sinusoidal PWM scheme. 11 K2 CO4
27. a) Discuss about the operation of a single phase full converter fed DC drive with necessary circuit diagrams. 11 K2 CO5
OR
 b) With a neat schematic diagram, explain the closed loop control of AC drive for a real time application. 11 K2 CO5
28. a) Apply the concepts of DC motor control to explain in detail the methods of electrical braking used in DC drives. 11 K3 CO5
OR
 b) Apply the principles of variable voltage and frequency control to explain the V/f control of an induction motor drive with a neat block diagram. 11 K3 CO5