Question Paper Code	12747

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2024

Sixth Semester

Electronics and Instrumentation Engineering
20EIPC603 - POWER ELECTRONICS, 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.	Indicate the basic operating principle of Bipolar Junction Transistor (BJT) in saturation mode.	2	K2	CO1
2.	State the function of gate turn-off thyristor (GTO).	2	K1	CO1
3.	Identify the factors affecting the performance of AC voltage controllers.	2	K2	CO2
4.	Name different types of single-phase rectifiers.	2	K1	CO2
5.	Define the term duty cycle and its importance in chopper operation.	2	K1	CO3
6	Why forced commutation is used in DC chopper?	2	K2	CO3
7.	Define the term "inverter" and its function in power electronics.	2	K1	CO4
8.	Indicate the advantages of Pulse width modulation (PWM) technique used in an inverter	2	K2	CO4
9.	Name the principles behind voltage/frequency (V/F) control of drives.	2	K1	CO5
10.	List the methods used for electrical braking in DC and AC machines.	2	K1	CO5

PART - B (5 × 13 = 65 Marks)
Answer ALL Questions

			Marks	K-Level	CO
11.	a) i)	Compare the operating principles of IGBT with power MOSFET.	7	K2	CO1
	ii)	Evaluate the advantages and disadvantages of using TRIAC over SCR in AC power control applications.	6	K2	CO1

OR

			Marks	K-Level	CO
	b) i)	Sketch the typical V-I characteristics of power diode and label the important regions in detail.	7	K2	CO1
	ii)	Describe the differences between series and parallel operation of power devices.	6	K2	CO1

			Marks	K-Level	CO
12.	a) i)	Explain how to calculate the average output voltage of a single-phase half-wave rectifier with necessary diagrams.	7	K2	CO2
	ii)	In a three-phase fully controlled rectifier, explain how the firing angle can be adjusted to control the output DC voltage.	6	K2	CO2

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create   **12747**

OR

b) Explain the operation of a single-phase full converter with RLE load using relevant waveforms. Obtain the expression for its average output voltage and RMS value of output voltage   *13 K2 CO2*

13. a) Describe the operation of buck-boost regulators with necessary diagram and waveforms.   *13 K2 CO3*

OR

b) Write about different classes of choppers in terms of characteristics, efficiency and performance.   *13 K2 CO3*

14. a) i) Explain the working principle of a single-phase full-bridge inverter circuit with a DC source.   *10 K2 CO4*

    ii) Interpret the concept of current source inverters.   *3 K2 CO4*

OR

b) Describe the functioning of resonant inverters including series ZVS, and ZCS types.   *13 K2 CO4*

15. a) Elucidate the operation of rectifier and chopper control techniques in DC drives.   *13 K2 CO5*

OR

b) Design and explain the block diagram representation of a closed-loop control scheme for an AC drive.   *13 K2 CO5*

PART - C (1× 15 = 15 Marks)

16. a) Draw and explain the schematic block diagram of SMPS and mention its advantages over linear power supply.   *15 K5 CO3*

OR

b) Evaluate the performance of various PWM techniques in terms of harmonic distortion and efficiency with suitable case study.   *15 K5 CO4*