Reg. No.															

Question Paper Code	13362

M.E. / M.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2024 (JAN - 2025)

First Semester

M.E. - Power Electronics and Drives

24PPEPC103 - ANALYSIS AND DESIGN OF POWER CONVERTERS

Regulations - 2024

Duration: 3 Hours | Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	List out the different types of controlled rectifier.	2	K1	CO1
2.	Recall the expression for the Average and RMS output voltage in single phase semi converter.	2	K1	CO1
3.	Find the output voltage of a buck-boost converter dependent on duty ratio.	2	K1	CO2
4.	A single quadrant chopper operating on third quadrant is supplied with load voltage wave form consists of square pulses of duration of 5 ms and overall chopping time period of 2 s .calculate the voltage ripple factor.	2	K2	CO2
5.	List out the design equation of inductor in optimum effective permeability.	2	K1	CO3
6.	Illustrate the input selection capacitor.	2	K2	CO3
7.	Explain the basic operation of the ZCS.	2	K2	CO4
8.	List the advantage of ZVS.	2	K1	CO4
9.	Show the advantages and disadvantages of unidirectional ac voltage controllers.	2	K1	CO5
10.	Compare between two stage and multi-stage sequence control of AC voltage regulator.	2	K2	CO5

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

			Marks	K – Level	CO
11.	a)	Summarize the effect of overlap on the performance of half controlled converters. Discuss with circuit and output waveform the working of single phase fully controlled converter with RL load in discontinuous mode of operation.	13	K2	CO1
		OR			
	b)	Examine on a three phase operation full controlled bridge converter.	13	K2	CO1
12.	a)	Explain the basic operation of a Fly back converter showing various modes and draw the steady state waveforms of discontinuous mode operation.	13	K2	CO2

OR

b) Illustrate the Push-pull converter configuration and Derive the expression for average output voltage. *13 K2 CO2*

13. a) Interpret the selection of output capacitor. *13 K3 CO3*

OR

b) Identify the core loss and describe the optimum effective Permeability in inductor design. *13 K3 CO3*

14. a) Compare the Zero Current Switching (ZCS)/ Zero Voltage Switching (ZVS). *13 K2 CO4*

OR

b) Summarize the classification of resonant converters. *13 K2 CO4*

15. a) Develop the expression for RMS output voltage, RMS load current and RMS thyristor current of a single phase full wave AC voltage controller for RL load. *13 K3 CO5*

OR

b) Explain the operation of a 3phase AC voltage regulator having six thyristors with neat sketches of voltage waveforms. Derive the expression for the RMS output voltage, RMS load current and RMS thyristor current for a single phase full wave AC voltage controller for R load. *13 K3 CO5*

PART - C (1× 15 = 15 Marks)

16. a) The single phase dual converter is operated from a 120V, 60 Hz supply and the load resistance is R=10Ω. The circulating inductance is Lr=40mH.delay angles are $\alpha1=60^o$ and $\alpha2=120^o$.Design the peak circulating current and peak current of converter1. *15 K2 CO1*

OR

b) Summarize the Three phase operation of semi-converter R and RL load and Evaluate the power factor improvement techniques and explain the reactive power. *15 K2 CO1*