Reg. No.													

Question Paper Code	12780

M.E. / M.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2024
First Semester
M.E - Power Electronics and Drives
20PPEPC103 - ANALYSIS AND DESIGN OF POWER CONVERTERS
Regulations - 2020

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.	Write down the expression for average output voltage of phase full converter.	2	K1	CO1
3.	Compare the buck boost converter and cuk converter.	2	K2	CO2
4.	Label the control characteristics of buck converter.	2	K2	CO2
5.	Categorize the different types of transformer cores.	2	K2	CO3
6.	Suggest the core loss of inductor design.	2	K2	CO3
7.	Classify the resonant converter.	2	K2	CO4
8.	State the advantage of ZVS.	2	K1	CO4
9.	Sketch the circuit diagram of single phase to single phase cycloconverter.	2	K1	CO5
10.	Define the matrix converter.	2	K1	CO5

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

11. a) Examine the principle of operation for a single phase full converter with R-L load and no freewheeling diode. Sketch the circuit diagram and draw the waveforms for source voltage, output voltage, load current and source current assuming a large inductor and no ripple in the output current. Derive the expression for RMS output voltage. *13 K2 CO1*

OR

    b) With necessary circuit and waveforms, explain the principle of operation of three phases fully controlled bridge converter feeding RL load and also write the expression for the average output voltage. *13 K2 CO1*

12. a) Estimate the principle of operation of a buck converter with circuit diagram showing the various modes. Derive the expression for output voltage and continuous inductor current and capacitor current. *13 K3 CO2*

OR

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create   **12780**

b) i)	Evaluate the fly back converter and draw the steady state waveforms of discontinuous mode operation.	10	K3	CO2
ii)	Compare fly back converter with forward converter.	3	K3	CO2

13. a) Design an inductor for a buck converter with suitable specifications.   13   K3   CO3

<div align="center">OR</div>

    b) Evaluate the selection of input and output filter capacitors.   13   K3   CO3

14. a) Summarize the operation of series loaded resonant converter and parallel loaded resonant converter with suitable sketches and waveform.   13   K2   CO4

<div align="center">OR</div>

    b) Evaluate the Buck-Boost ZCS Quasi Resonant DC-DC Converter with its suitable circuit and characteristics.   13   K2   CO4

15. a) Elucidate with circuit diagram and waveform the principle of phase control of single phase controller with RL load and obtain expression for voltage and power factor.   13   K2   CO5

<div align="center">OR</div>

    b) Illustrate the operating principle of three phase to single phase cycloconverter with appropriate circuit and waveform.   13   K2   CO5

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PART - C (1 × 15 = 15 Marks)

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16. a) With neat sketches, explicate the operation of single phase dual converter in circulating current mode with its suitable waveform.   15   K5   CO1

<div align="center">OR</div>

    b) Illustrate three phase to three phase cyclo converter with relevant circuit arrangements. Draw and explain the control circuit block diagram for a cyclo converter with non- circulating current mode.   15   K4   CO5