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Question Paper Code : 11186

M.E./M.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

First Semester

Power Electronics and Drives

PX 5152 – ANALYSIS AND DESIGN OF POWER CONVERTERS

(Common to: M.E. Power Systems Engineering)

(Regulation 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the function of freewheeling diodes in controlled rectifier?
2. Draw the waveform for three phase half wave positive converter in inversion mode.
3. Outline the advantages of current commutated chopper.
4. Define PWM control in DC chopper.
5. What is meant by permeability?
6. Illustrate the effects of air gap.
7. List the classification of resonant converters.
8. State the disadvantage of disconduction mode of resonant converters.
9. Write the equation for modulation factor of the cyclo converter.
10. Show the advantages and disadvantages of AC voltage controller.

PART B — (5 × 13 = 65 marks)

11. (a) Describe the working of three phase converters.

Or

- (b) Draw the necessary circuit of single phase full converter with RL load, voltage and current waveforms and explain its operation.

12. (a) Describe the operation of Buck converter with neat diagram.

Or

- (b) Explain the operation of CUK converter in detail.

13. (a) Explain the Transformer Dissipation, by Radiation and Convection in detail.

Or

- (b) Describe the output power P_o versus Apparent Power P_t , capability of the power transformer.

14. (a) Illustrate the frequency characteristics of parallel resonant circuit with neat diagram.

Or

- (b) Demonstrate the working of series loaded resonant dc-dc converter with neat diagram

15. (a) Outline the working of single phase to single phase cyclo converter

Or

- (b) Demonstrate the working of single phase AC controller

PART C — (1 × 15 = 15 marks)

16. (a) In a Cuk converter operating at 50kHz, $L_1=L_2=1$ mH and $C = 5\mu F$. The output capacitor is sufficiently large to yield an essentially constant output voltage. Here $V_d= 10$ V and the output V_o is regulated to be constant at 5 V. It is supplying 5 W to a load. Assume ideal components. Evaluate the percentage errors in assuming a constant voltage across C_1 or in assuming constant currents i_{L1} and i_{L2} .

Or

- (b) In a buck-boost converter operating at 20 kHz, $L = 0.05$ mH: The output capacitor C is sufficiently large and $V_d = 15$ V. The output is to be regulated at 10V and the converter is supplying a load of 10W. Evaluate the duty ratio D . Find whether the converter is operating in CCM or DCM mode.