

SIXTH SEMESTER BTECH DEGREE EXAMINATION

Branch: Electrical and Electronics Engineering

13.606.3 SWITCHED MODE POWER CONVERTERS (E)

MODEL QUESTION PAPER

Time:3 Hours

Maximum Marks:100

PART A

Answer all questions. Each question carries 2 marks

1. Explain the principle of volt second balance in inductors?
2. Obtain the input-output voltage and current relation as a function of duty ratio for a Buck-Boost dc-dc converter in continuous conduction mode.
3. Define the terms DPF, THD and explain its significance.
4. What is meant by ZVS and ZCS
5. Explain the concept of Switch utilization factor in three phase inverters.
6. List out the difference between fly back and push pull topologies.
7. What is the need of power conditioners in power system?
8. Describe the classification of load resonant converters.
9. Explain the concept of programmed harmonic elimination.
10. Describe the impact of Dead time in the operation of inverters.

(2X10=20 Marks)

PART B

(4X20=80 MARKS)

MODULE I

- 11.A) Illustrate the operation of Step down converter in continuous conduction mode and derive an expression for the ripple voltage. **12**

B) Design a Buck converter to produce an output voltage of 18 V across 10 ohm load resistance. The output voltage ripple must not exceed 0.5 percent. The DC supply is 48 V. Design for continuous inductor current. Find out the duty ratio, the values of inductance and capacitor.

OR

12.A) Explain the bipolar and unipolar PWM switching schemes used in full bridge dc-dc converter **12**

B) Design a Buck-Boost converter circuit having parameters, input voltage =24 V, D=0.4, load resistance =5 ohm, L=20 micro H, C=80 micro F. Determine the output voltage, average inductor current, Maximum and minimum value of inductor current and the output voltage ripple. Assume a switching frequency of 100 kHz. **8**

MODULE II

13. With the help of neat diagram explain the three phase inverter operation, also discuss the effect of blanking time on voltage in PWM inverters

OR

14. Explain square wave switching scheme in inverter and how to achieve the programmed harmonic elimination technique used in square wave pulse switching

MODULE III

15.A) Using suitable waveforms, explain the working of Series Loaded resonant dc-dc converter in discontinuous conduction mode for switching frequency (ω_s) less than half the resonant frequency (ω_o) **15**

B) Write short note on resonant switch converters **5**

OR

16.A) Explain the operation of ZCS resonant switch converters **15**

B) List the various classification of resonant converters **5**

MODULE IV

17.A) Explain the principle operation of a fly back and pushpull converter **12**

B) Explain power line disturbances caused by switching power converters **8**

OR

18.A) Write short note on UPS **5**

B) Draw the circuit diagram and explain the operation of a full bridge push pull converter and draw the load current and load voltage waveform. **15**