

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Summer 2018 - 19 Examination

Semester: 5
Subject Code: 03106330
Subject Name: Power Electronics Converters

Date: 21/05/2019
Time: 10:30am to 01:00pm
Total Marks: 60

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions - (All are compulsory) (Each of one mark) (15)

1. The turn-on time of an SCR with inductive load is 20 μ s. The pulse train frequency is 2.5 KHz with a mark/space ratio of 1/10, then SCR will
 (A) Not turn on. (B) Turn on.
 (C) Turn on if inductance is removed. (D) Turn on if pulse frequency is increased to two times.
2. A power semiconductor may undergo damage due to
 (A) High di/dt. (B) Low di/dt. (C) High dv/dt. (D) Low dv/dt.
3. In order to make full use of the IGBT's a high speed switching capabilities; it is recommended using a Opto - Coupler with a _____ signal transmission delay.
 (A) Short (B) Long (C) Bandwidth Base (D) All of these
4. Which one of the following acts as an energy store in a DC to DC Converter?
 (A) The inductor. (B) The high frequency switching transistor.
 (C) The Load. (D) The flywheel diode.
5. In a 3 phase, 12-pulse controlled converter for continuous conduction mode, each SCR conducts for _____ per cycle.
 (A) 60 degrees. (B) $3\pi/2$ radians (C) $\pi/6$ radians (D) 12 degrees
6. A modern power semiconductor device that combines the characteristic of BJT and MOSFET is _____.
7. Compared to transistor, _____ have lower on state conduction losses and higher power handling capability.
8. For a high frequency transformer the relation between the transformer size and frequency of voltage waveform can be given as, Size _____ with frequency _____.
9. In a flyback converter, the inductor of the buck-boost converter has been replaced by a/an _____.
10. Resistor is used in Snubber circuit to _____ the discharging current.
11. What are the main components used for isolating the power circuits, power semiconductor from the low - power circuit?
12. What is the average value of the output voltage in a Buck DC - DC Converter?
13. Uneven loss distribution in the devices is the disadvantage of Diode - Clamp type of multilevel inverter. (True/False)
14. What is a general function of cascaded multilevel inverter from several separate DC sources?
15. Through Flying capacitor multilevel inverter both real and reactive power flow can be controlled. (True/False)

Q.2 Answer the following questions. (Attempt any three) (15)

- A) Give Comparison between Power MOSFET and Power BJT.
- B) Explain the Diode Clamped multilevel inverter.
- C) Discuss operation of Cascaded H-bridge multilevel inverter.
- D) Explain commutation circuits in gate drive circuits of thyristor.

Q.3 A) Draw and explain circuit diagram and output waveform of 6-pulse converter. Discuss their performance in view point of harmonics. (07)

- B) Explain Flying Capacitor 5-level multilevel inverter configuration, Features of Diode Clamped multilevel inverter and Advantages and Disadvantages of Diode Clamped multilevel inverter. (08)

OR

- B) List out different configuration of phase shift transformer? Explain $\Delta / Z-1$ with using circuit and phasor diagram? (08)

Q.4 A) Explain operation of Fly-back converter with necessary wave-form. (07)

OR

A) Explain operation of Forward converter with necessary wave-form. (07)

B) Explain buck converter using circuit diagram and waveform also derive the equation for rate of change of inductor current, rate of change of capacitor voltage using output voltage and output current for buck converter. (08)