

Unit 12 - Week 11

Course outline

How does an NPTEL online course work?

Week 1

Week 2

Week 3

Week 4

Week 5

Week 6

Week 7

Week 8

week 9

Week 10

Week 11

● Basics of Gate Driver Circuits

● Gate Driver Circuits - Turn-on and Turn-off Process

● Gate Driver Circuits - Features of Gate Drivers and Basics of Bootstrap Functionality

○ Lecture Slides Week 11

○ Quiz : Assignment 11

○ Week 11 Feedback Form

Week 12

Download Videos

Assignment Solutions

Text Transcripts

Assignment 11

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-04-15, 23:59 IST.

1) Which of the following is the most appropriate statement, regarding the gate current drawn by a MOSFET during the process of turning on? **1 point**

- The gate current is initially negligible and then becomes high
- The gate current is initially high and then becomes negligibly small
- The gate current is throughout constant and a low value
- The gate current is throughout constant and a high value

No, the answer is incorrect.
Score: 0

Accepted Answers:
The gate current is initially high and then becomes negligibly small

2) In static characteristic of an IGBT, the V_{CE} voltage drop decreases with **1 point**

- Increase in gate source voltage
- Decrease in gate source voltage
- Increase in gate resistance
- Decrease in gate resistance

No, the answer is incorrect.
Score: 0

Accepted Answers:
Increase in gate source voltage

3) Which of the following is not an advantage of using a bipolar supply ($+V_{CC}$ and $-V_{EE}$) in driving an IGBT? **1 point**

- It causes faster turn off
- It gives better immunity against parasitic turn on
- It causes higher turn off current
- It reduces turn off losses

No, the answer is incorrect.
Score: 0

Accepted Answers:
It causes higher turn off current

4) Which among the following is true, when a short circuit happens in an IGBT? **1 point**

- It moves from active to saturation region
- It moves from saturation to active region
- It moves from saturation to cut-off region
- It moves from active to cut-off region

No, the answer is incorrect.
Score: 0

Accepted Answers:
It moves from saturation to active region

5) In gate driver circuits, the need of using two gate resistances for turn-on and turn-off process arises mainly due to **1 point**

- Difference in parasitic inductances during turn-on and turn-off process
- Difference in parasitic capacitances during turn-on and turn-off process
- Difference in turn-on and turn-off times
- Difference in the DC-link voltage

No, the answer is incorrect.
Score: 0

Accepted Answers:
Difference in turn-on and turn-off times

6) The voltage rating of the D_{boot} diode in bootstrap circuit is, **1 point**

- Same as DC-link voltage
- Same as control supply voltage
- Half of DC-link voltage
- Half of control supply voltage

No, the answer is incorrect.
Score: 0

Accepted Answers:
Same as DC-link voltage

7) Which among the following statement is not true with reduction in gate resistance value? **1 point**

- Faster turn on
- Higher dv/dt
- Increase in radiated EMI
- Higher switching losses

No, the answer is incorrect.
Score: 0

Accepted Answers:
Higher switching losses

8) The total gate charge required from a gate driver circuit to turn on the device is 2000nC. The control supply voltages are $V_{DD} = +15$ V and $-V_{EE} = -8$ V. **1 point**
The device is operating at 20kHz switching frequency. Then the total power loss in gate side of the device (including inside gate driver IC) is approximately equal to,

- 560mW
- 730mW
- 920mw
- 250mW

No, the answer is incorrect.
Score: 0

Accepted Answers:
920mw

9) In an application, the maximum DC-link voltage is equal to 600 V and switching frequency is 1 MHz. Assuming collector voltage transition time is $1/10^{\text{th}}$ of switching time, the common mode transient immunity of gate driver circuit should be, **1 point**

- Higher than 6 kV/ μ sec
- Higher than 0.6 kV/ μ sec
- Lesser than 6 kV/ μ sec
- Lesser than 0.6 kV/ μ sec

No, the answer is incorrect.
Score: 0

Accepted Answers:
Higher than 6 kV/ μ sec

10) In bootstrap gate driving circuit, with decrease in switching frequency, the size of the bootstrap capacitor will, **1 point**

- increase.
- decrease
- not change with frequency
- cannot be said

No, the answer is incorrect.
Score: 0

Accepted Answers:
increase.