Roll No. ⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚   **Total No. of Pages : 02**

Total No. of Questions : 08

M.Tech.(Power System) (E-II 2013)   (Sem.–2)
ADVANCE POWER ELECTRONICS
Subject Code : MTPS-205A
Paper ID : [A2520]

Time : 3 Hrs.   **Max. Marks : 100**

INSTRUCTION TO CANDIDATES :
1. **Attempt any FIVE questions out of EIGHT questions.**
2. **Each question carries TWENTY marks.**

1. Discuss how conduction takes place in the n channel power MOSFET. The parameters of the circuit shown in Fig. 1 are V_{DD} = 5 V, R_1 = 520 KΩ, R_2 = 320kΩ, R_D = 10 kΩ, and R_{Si} = 0. Assume transistor parameters of V_{TN} = 0.8 V, K_n = 0.20mA/V^2, and λ= 0.

   a) Determine the small-signal parameters g_m and r_o.

   b) Find the small-signal voltage gain v_0/v_i.

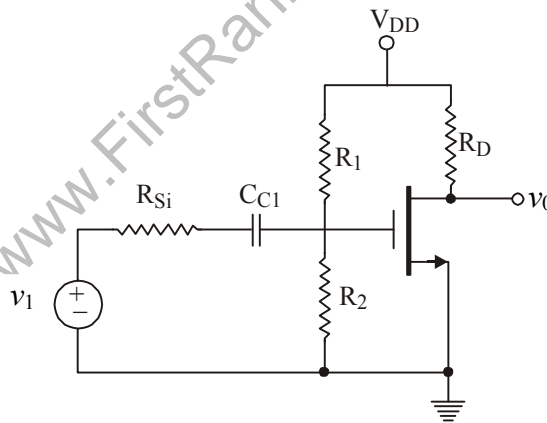   c) Calculate the input and output resistances R_i and R_o.

Fig.1

2. What is an IGBT? Give its basic structural features. How does it differ from PMOSFET? Draw and explain input-output characteristics.

3. Discuss about snubber circuits. What is the need of snubber circuits? Also discuss different types of snubber circuits.

4. a) Snubber circuit for an SCR should primarily consist of capacitor only. But in actual practice, a resistor is used in series with the capacitor. Why?

   b) R, L and C in an SCR circuit meant for protecting against $\frac{dv}{dt}$ and $\frac{di}{dt}$ are 4 ohm, 6μH and 6μF respectively. If the supply voltage to the circuit is 300V, calculate permissible maximum values of $\frac{dv}{dt}$ and $\frac{di}{dt}$.

5. a) What is diode? Give the difference between power and signal diodes.

   b) Discuss the difference between p-n junction diodes and schottky diodes.

6. a) Discuss the different types of protections for drive circuits.

   b) What do you understand by the terms shielding and partitioning of drive circuit?

7. Give structural details of MCT. Draw static I-V characteristics. Compare it with other semiconductor devices.

8. Describe the driving circuit using bipolar transistor. Explain its working principle with proper mathematical equations and circuit diagram.