

**Instructions:**

1. Attempt any THREE questions out of first EIGHT questions in SECTION-I.
2. Question NINE in SECTION – II is compulsory.

**SECTION-I**

- Q-1 (A) Explain structure and properties of E- plane tee. 7  
 (B) Define scattering parameters for a two port network. Obtain S- matrix for E- plane tee. 7
- Q-2 (A) Write a short note on magic tee. 7  
 (B) What is directional coupler? What are the different types of directional couplers? Draw their structures. 7  
 Explain working of a directional coupler.
- Q-3 (A) With neat diagram describe construction and working of reflex klystron. 7  
 (B) Obtain equation for bunching parameter of reflex klystron. 7
- Q-4 (A) With neat diagram describe construction and working of two cavity klystron. 7  
 (B) Discuss limitations of low frequency vacuum tubes at microwave frequency. 7
- Q-5 (A) In case of BJT, explain switching phenomenon in detail with necessary figure. 7  
 (B) Explain capacitance and charging time in frequency limitations of transistors. 7
- Q-6 (A) Discuss saturation phenomenon in BJT in detail. 7  
 (B) Discuss Kirk effect and Webster effect in detail. 7
- Q-7 (A) In case of Fabrication of p-n junction, explain the thermal oxidation in detail. 7  
 (B) State types of metal-semiconductor Junctions and explain the Schottky barrier in detail. 7
- Q-8 (A) Explain the ohmic and rectifying contacts in detail. 7  
 (B) Explain MOSFET structure in detail. 7

**SECTION-II**

- Q-9 Select correct answer from the given options (Each question is of ONE mark) 8
- 1 \_\_\_\_\_ is a microwave passive device.  
 (a) Reflex klystron  
 (b) Directional coupler  
 (c) Travelling Wave Tube  
 (d) Gunn diode
- 2 In H-plane tee, the side arm is  
 (a) multiplier arm  
 (b) magic arm  
 (c) subtractor arm  
 (d) adder arm

- 3 Apple gate diagram is a \_\_\_\_\_  
 (a) Density against time plot.  
 (b) Distance against time plot  
 (c) Voltage against time plot  
 (d) Velocity against time plot
- 4 Mode curves of a reflex klystron are  
 (a) the electronic admittance spiral curves  
 (b) the distance against time plots  
 (c) the power output and frequency characteristics plots  
 (d) the radiation pattern plots
- 5 In case of diffusion, if dopant atoms are supplied continuously, such that the concentration at the surface is maintained at constant value, the distribution follows what is called \_\_\_\_\_.  
 (a) N-channel error function  
 (b) complementary error function  
 (c) Elementary error function  
 (d) Thermal Budget
- 6 The semiconductor surface contains surface states due to incomplete \_\_\_\_\_ bonds and other effects, which can lead to charges at metal-semiconductor interface. The contact is automatically \_\_\_\_\_ discontinuity between semiconductor crystal and metal.  
 (a) Covalent, Diminishes  
 (b) Metal, Sharp  
 (c) Metal, Diminishes  
 (d) Covalent, Sharp
- 7 An important consideration in this process is to isolate the gate from the channel current flow. If the \_\_\_\_\_ is not isolated from the channel, it draws a lot of current, leading to a device that has a \_\_\_\_\_.  
 (a) Gate, Poor gain  
 (b) Poor gain, Source  
 (c) High gain, Gate  
 (d) Gate, High gain
- 8 \_\_\_\_\_ free carriers are produced in a channel by the process of "inversion" where a gate bias pulls the bandedges to a point lower than the \_\_\_\_\_ level and thus creates free carriers.  
 (a) FET, Fermi  
 (b) MOFFET, Fermi  
 (c) FET, Conduction  
 (d) MOSFET, Conduction