Delhi Technological University

EC101- Basic Electronics & Communication

ASSIGNMENT-1

Max. Marks: 25 ***Last date of submission: 22/09/2025***

Note: Answer ***all*** questions. Assume suitable missing data, if any.

CO1: Explain the principles of operation of semiconductor devices such as diode, BJT, JFET and MOSFET.
CO2: Apply the basic principles to solve numerical problems related to diode and transistors and their applications.
CO3: Simplify logical expressions using Boolean algebra and K-maps.
CO4: Design combinational and sequential digital circuits.
CO5: Explain the concepts of analog modulation schemes.
CO6: Describe the concepts of digital modulation schemes.

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1. Determine V_o *and* I_D for the networks of **Fig. 1**. **[CO2] [2 marks]**

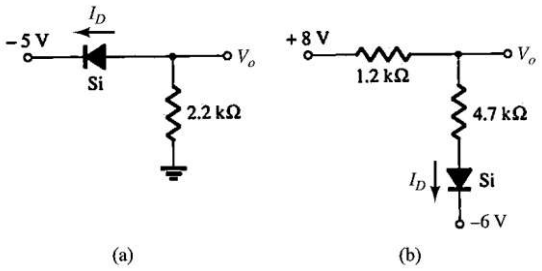


Fig.1

2. Determine v_0 and the required PIV rating of each diode for the configuration of **Fig.2**. In addition, determine the maximum current through each diode. **[CO2] [3 marks]**

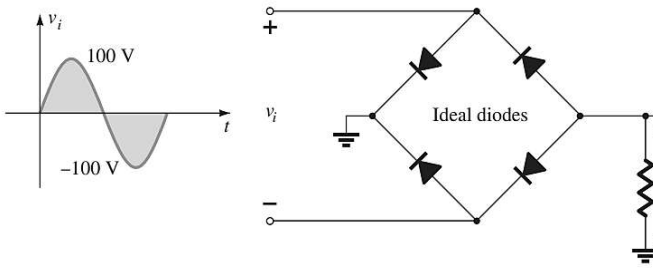


Fig.2

3. Sketch v_0 for each network of **Fig. 3** for the input shown. **[CO2] [3 marks]**

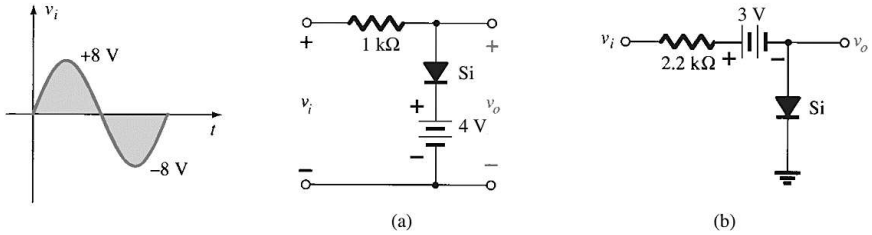


Fig.3

4. Sketch v_0 for the network shown in **Fig.4**. Compare discharge time of a capacitor to half the period of the applied signal. **[CO2] [3 marks]**

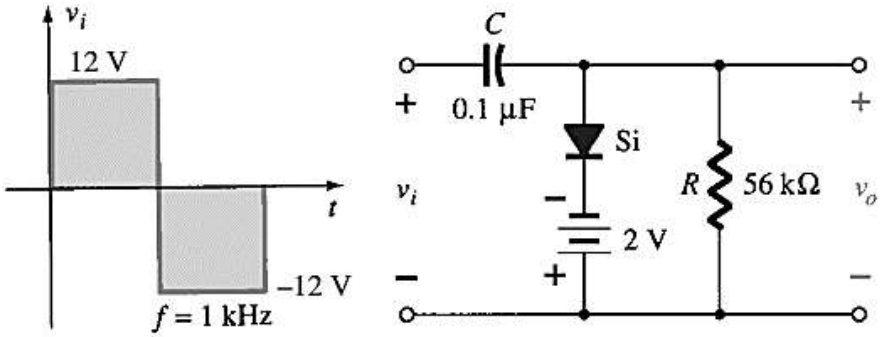


Fig.4.

5. a. Determine V_L , I_L , I_Z , and I_R for the network of **Fig. 5,** if $R_L = 180\ \Omega$.
   b. Repeat part (a) if $R_L = 470\ \Omega$.
   c. Determine the value of R_L that will establish maximum power conditions for the Zener diode.
   d. Determine the minimum value of R_L to keep Zener diode is in the "on" state. **[CO2] [4 marks]**

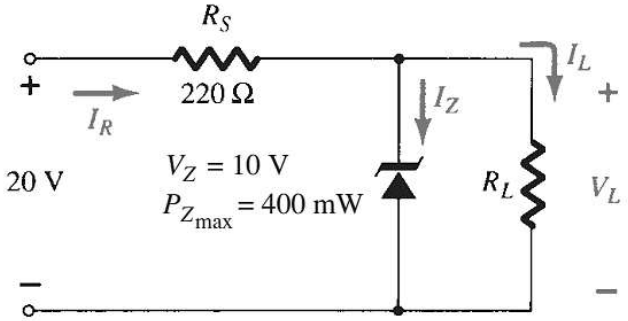
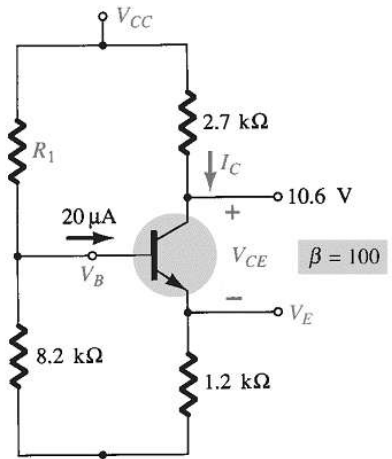


Fig.5

6. Given the information appearing in **Fig. 6**, determine:
   a. I_C
   b. V_E
   c. V_{CC}
   d. V_{CE}
   e. V_B
   f. R_1

[CO2] [3 marks]



7. Derive a relationship between $\alpha, \beta \; and \; \gamma$ of a BJT. **[CO1] [2 marks]**

8. What is the significant difference between the construction of an enhancement-type MOSFET and a depletion-type MOSFET? **[CO1] [2 marks]**

9. a. Given I_{DSS} = 12 mA and V_P = -4 V, sketch the transfer characteristics for the JFET.
   b. Sketch the drain characteristics for the device of part (a). **[CO2] [3 marks]**

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