

North East University Bangladesh  
Department of Computer Science and Engineering  
Continuous Assessment Spring 2024  
Program: B.Sc. (Eng.) in CSE  
Course: CSE-06131213(Electronic Devices and Circuits)

---

**Instructions: Answer all the questions.**

**Questions MUST be WRITTEN before the answers.**

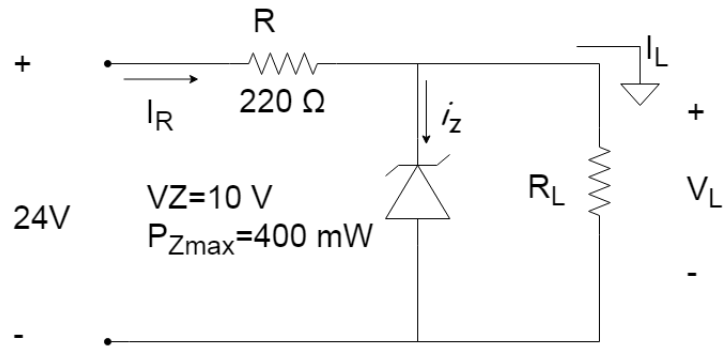
**Write your answers neatly with only adequate amount of explanations and diagrams where necessary. If not required avoid unnecessary explanation.**

**In all mathematical questions you must show all the steps.**

**These questions are automatically selected from pools of questions. As a result there is possibility of same questions appearing multiple times. In such cases you have to answer the questions multiple times.**

**Answer parts of a question together.**

1. Write down the answer of the questions in 2 line or less.
  - (a) Write down the Shockley's equation.
  - (b) What are some applications of LED.?
  - (c) Find the range of wavelength for the frequency range of visible light (400 THz–750 THz).
2. Explain the purpose of capacitor in a rectifier circuit.
3. What is the difference between clipper and clamper circuit?
4. Explain the difference between zener breakdown and avalanche breakdown.
5. Draw a proper biased Common Emitter BJT circuit for amplification purpose.
6. Design a three input AND gate using resistors and diodes. Show proper workings.
7. Design a four input AND gate using resistors and diodes. Show proper workings.
8. Find the value of resistor required to drive 6 GREEN LEDs in parallel with a supply of 15V such that they operate at their nominal 20 mA current. Consider a nominal voltage drop for a GREEN LED to be 1.8V.
9. Find the value of resistor required to drive 5 RED LEDs in series with a supply of 15V such that they operate at their nominal 20 mA current. Consider a nominal voltage drop for a RED LED to be 1.8V.
10. Design a 4.voltage regulator using zener diode. Show proper workings.
11. What maximum Zener voltage drop can be expected for a 9V Zener diode operating at 83Celsius with a temperature coefficient of 0.1%/ Celsius?
12. What frequency of EM radiation will be provided by a PN junction during the recombination process when the energy gap is 2.3eV?
13. Determine  $V_L, I_L, I_z$ , and  $I_R$  for the Zener diode circuit in figure below if  $R_L = 180\Omega$ .



14. Determine the minimum input voltage required for regulation to be established in figure below. Assume an ideal zener diode with  $I_{ZM} = 4.5\text{mA}$  and  $V_Z = 21\text{V}$ .



15. To what value must R be adjusted in figure below to make  $I_Z = 70\text{mA}$ ? Assume  $V_Z = 8\text{V}$



16. Specify the number of limiting resistors and their value for a series-parallel array of 69 red LEDs using a 9 V dc source for a forward current of 20 mA.
17. Develop a yellow LED traffic-light array using a minimum number of limiting resistors that operates from a 24 V supply and consists of 100 LEDs with an equal number of LEDs in each parallel branch. Show the circuit and the resistor values.
18. Find data-sheet of a 4.8V zener diode and find the following-
- Part number
  - $I_Z T$
  - $Z_Z T$
  - Characteristics curve

—End of Questions—