

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)

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**Instructions: Answer all the questions.**

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

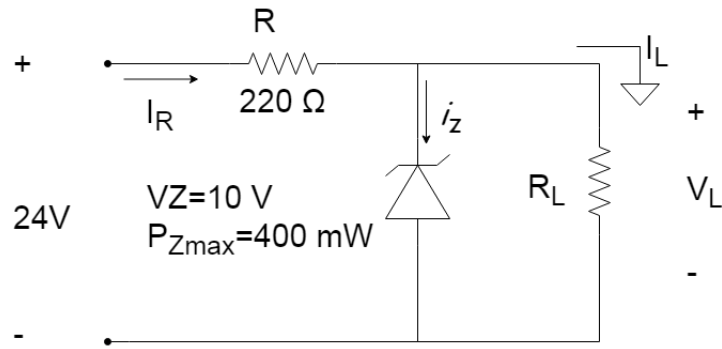
**Write your answers neatly with only adequate amount of explanations and diagrams where necessary. If not required avoid unnecessary explanation.**

**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 is reverse recovery time of a diode?
  - (c) Find the range of wavelength for the frequency range of visible light (400 THz–750 THz).
2. Why is driving LEDs at higher current harmful?
3. Explain the difference between zener breakdown and avalanche breakdown.
4. Explain the purpose of capacitor in a rectifier circuit.
5. Draw the input characteristics and output characteristics of Common Collector configuration of BJT.
6. Design a full wave bridge rectifier using 4 diodes showing the output wave for a sinusoidal input. Clearly show any workings.
7. Design a half wave rectifier showing proper working.
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 6 GREEN 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 GREEN LED to be 1.8V.
10. Design a 1.voltage regulator using zener diode. Show proper workings.
11. What maximum Zener voltage drop can be expected for a 2V Zener diode operating at 77Celsius 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 8.6eV?
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  $I_{ZM} = 1.5mA$  and  $V_Z = 41V$ .



15. To what value must R be adjusted in figure below to make  $I_Z = 50mA$ ? Assume  $V_Z = 6V$



16. Specify the number of limiting resistors and their value for a series-parallel array of 73 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—