

Set: 1

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.

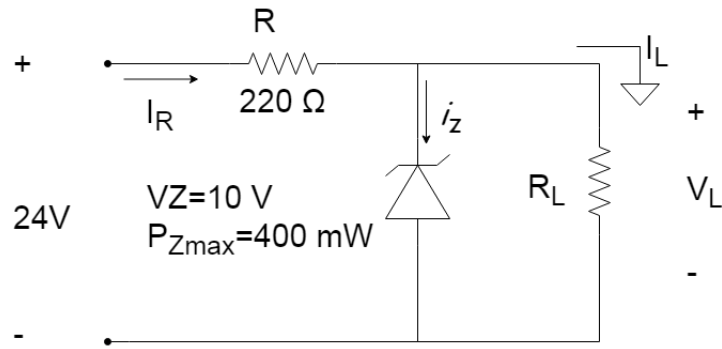
Write your answers neatly with only adequate amount of explanations and diagrams where necessary. If not required avoid unnecessary explanation.

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) Draw the components of the piecewise-linear equivalent circuit of a diode.
 - (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. Draw the equivalent model of a zener diode for both forward and reverse bias.
4. Explain the condition necessary for a clamper circuit to work.
5. Explain the relationship between gain factor alpha and beta of a transistor.
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 three input OR gate using resistors and diodes. Show proper workings.
8. Find the value of resistor required to drive 6 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.
9. Find the value of resistor required to drive 6 RED 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 RED LED to be 1.8V.
10. Design a 6V voltage regulator using zener diode. Show proper workings.
11. What maximum Zener voltage drop can be expected for a 6V Zener diode operating at 47°C with a temperature coefficient of 0.1%/°C?
12. What frequency of EM radiation will be provided by a PN junction during the recombination process when the energy gap is 5.2eV?
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 $I_{ZM} = 3.5mA$ and $V_Z = 83V$.



15. To what value must R be adjusted in figure below to make $I_Z = 50mA$? Assume $V_Z = 2V$



16. Specify the number of limiting resistors and their value for a series-parallel array of 24 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—