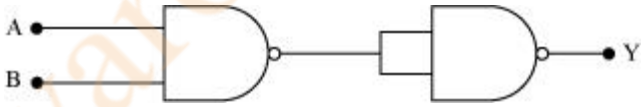
Semiconductor Electronics:Materials, Devices and Simple Circuits

Q.No.1:
Draw the circuit diagram of an illuminated photodiode in reverse bias. How is photodiode used to measure light intensity?

CBSE Board Paper 2010

Q.No.2:
(a) Explain the formation of depletion layer and potential barrier in a p−n junction.
(b) In the figure given below the input waveform is converted into the output waveform by a device 'X'. Name the device and draw its circuit diagram.

(c) Identify the logic gate represented by the circuit as shown and write its truth table.



OR
(a) With the help of circuit diagram explain the working principle of a transistor amplifier as an oscillator.
(b) Distinguish between a conductor, a semiconductor and an insulator on the basis of energy band diagrams.

CBSE Board Paper 2010

Q.No.3:
What happens to the width of the depletion layer of a p-n junction when it is (i) forward biased, (ii) reverse biased?

CBSE Board Paper 2011

Q.No.4:
Draw a labeled diagram of a full wave rectifier circuit. State its working principle. Show the input-output waveforms.

CBSE Board Paper 2011

Q.No.5: Plot a graph showing variation of current versus voltage for the material GaAs. **CBSE Board Paper 2014**

Q.No.6: (a) State briefly the processes involved in the formation of p-n junction explaining clearly how the depletion region is formed.
(b) Using the necessary circuit diagrams, show how the V-I characteristics of a p-n junction are obtained in
(i) Forward biasing
(ii) Reverse biasing
How are these characteristics made use of in rectification?

OR

(a) Differentiate between three segments of a transistor on the basis of their size and level of doping.
(b) How is a transistor biased to be in active state?
(c) With the help of necessary circuit diagram, describe briefly how n-p-n transistor in CE configuration amplifies a small sinusoidal input voltage. Write the expression for the ac current gain. **CBSE Board Paper 2014**

Q.No.7: Distinguish between 'intrinsic' and 'extrinsic' semiconductors.

CBSE Board Paper 2015

Q.No.8: Explain briefly with the help of necessary diagrams, the forward and the reverse biasing of a p-n junction diode. Also draw their characteristic curves in the two cases. **CBSE Board Paper 2017**

Q.No.9: (a) A student wants to use two p-n junction diodes to convert alternating current into direct current. Draw the labelled circuit diagram she would use and explain how it works.
(b) Give the truth table and circuit symbol for NAND gate.

CBSE Board Paper 2018

Q.No.10: The _____, a property of materials C, Si and Ge depends

upon the energy gap between their conduction and valence bands.
CBSE Board Paper 2020

Q.No.11: The ability of a junction diode to _____ an alternating voltage, is based on the fact that it allows current to pass only when it is forward biased.
CBSE Board Paper 2020

Q.No.12: Draw the circuit diagram of a full wave rectifier. Explain its working showing its input and output waveforms. **CBSE Board Paper 2020**

Q.No.13: Explain the formation of potential barrier and depletion region in a p-n junction diode. What is effect of applying forward bias on the width of depletion region? **CBSE Board Paper 2020**

Q.No.14: With the help of a circuit diagram, explain briefly how a *p*-*n* junction diode works as a half-wave rectifier. **CBSE Board Paper 2022**

Q.No.15: (i) Draw V-I characteristics of a p-n Junction diode.
(ii) Differentiate between the threshold voltage and the breakdown voltage for a diode.
(iii) Write the property of a junction diode which makes it suitable for rectification of ac voltages. **CBSE Board Paper 2022**

Q.No.16: Two crystals C_1 and C_2, made of pure silicon, are doped with arsenic and aluminium respectively.
(i) Identify the extrinsic semiconductors so formed.
(ii) Why is doping of intrinsic semiconductors necessary?
CBSE Board Paper 2022

Q.No.17: Give two differences between a half wave rectifier and a full wave rectifier. **CBSE Board Paper 2022**