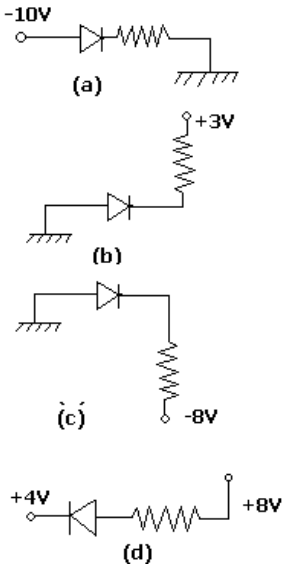
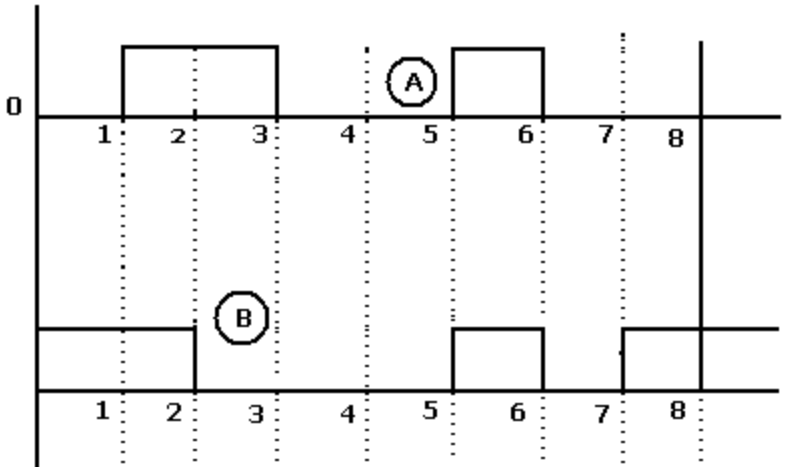
PLOT 5C, 2ND FLOOR, GANAPATI COMPLEX, SEC-13, OPP. JAIPURIA SCHOOL, VASUNDHARA, GHAZIABAD (U.P)

ELECTRONIC DEVICES

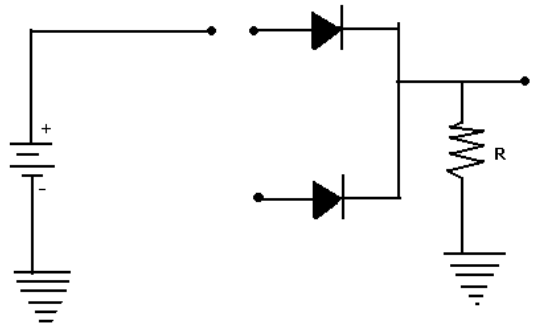
1. How does the d.c. current gain of a transistor change, if the width of the base region is increased?
2. Name the type of biasing of a p-n junction diode so that the junction offers very high resistance.
3. Name one impurity each, which when added to pure Si. Produces (i) n- type and (ii) p- type semiconductor.
4. Draw the energy band diagram of a p-type semiconductor.
5. Which of the diodes is (i) forward biased, and (ii) reverse biased in the following circuits? Justify your answer.



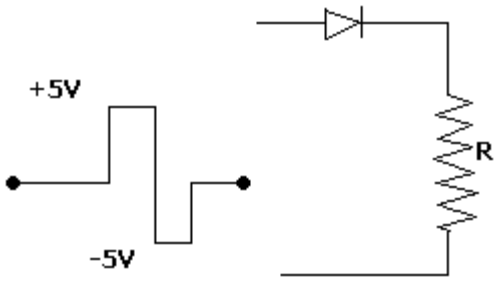
6. Two signals A and B shown in the given figure are used as two inputs of a NAND gate. Draw its output wave form. Give the logic symbol of NAND gate. Draw its output wave form. Give the logic symbol of NAND gate.



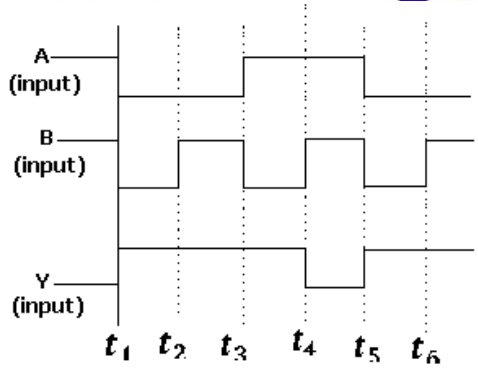
7. With a help of a circuit diagram, explain the use of p-n junction diode as a full wave rectifier.
8. How does the energy gap of an intrinsic semiconductor vary, when doped with a trivalent impurity?
9. Name the logic gate realized using p-n junction diodes in the given diagram. Give its logic symbol.



10. Give the ratio of the number of holes and the number of conduction electrons in an intrinsic semiconductor.
11. Draw and explain the output wave forms across the load resistor R, if the input wave form is as shown in the given figure.

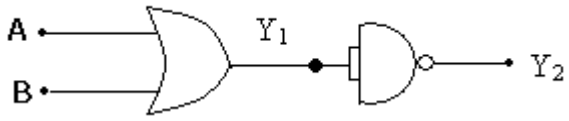


12. The output of an unregulated D.C. power supply is to be regulated. Name the device that can be used for this purpose and draw the relevant circuit diagram.
13. The following figure shows the input wave forms (A, B) and the output wave form (Y) of a gate. Identify the gate and write its truth table.

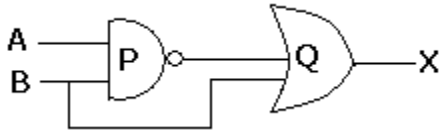


14. Draw a labeled circuit diagram to show the use of zener diode as a voltage regulator.
15. Show the biasing of a photodiode with the help of a circuit diagram. Draw graphs to show variations in reverse bias currents for different illumination intensities.
16. How does the resistivity of (i) a conductor and (ii) a semiconductor vary with temperature? Give reason for each case.
17. With the help of a diagram, show the biasing of a light emitting diode (LED). Give its two advantages over conventional incandescent lamps.
18. Name the p-n junction diodes which emit spontaneous radiation when forward biased. How do we choose the semiconductor, to be used in these diodes, if the emitted radiation, is to be in the visible region?

19. Which special type of diode can act as a voltage regulator? Give the symbol of this diode and draw the general shape of its V-I characteristics.
20. A logic gate has been obtained by applying the negation (NOT) operation after OR gate. Name the gate so formed. Write the symbol and the truth table of this gate.
21. For the digital circuit below, write the truth table showing the outputs $Y_1 : Y_2$ for all possible inputs at A and B.



22. The potential difference across the collector of a transistor, used in common emitter mode is 1.5 V, with the collector resistance of 3kΩ. Find
    a. The emitter and
    b. The base current, if the d.c. gain of the transistor is 50.
23. Identify the logic gates marked P and Q in the given logic circuit. Write down the output at X for the inputs (i) A =0, B =0 and (ii) A = 1, B = 1.

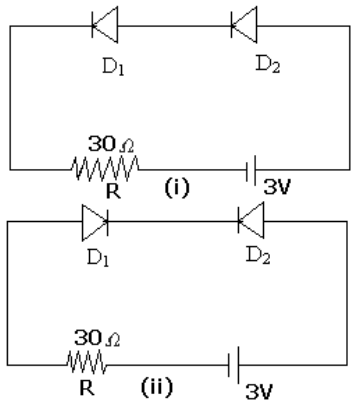


24. Explain the formation of the 'depletion layer' and the 'potential barrier' in a p-n junction diode.
25. How is an n- type semiconductor formed? Name the major charge carriers in it. Draw the energy band diagram of an n-type semiconductor.
26. Name the 2- input logic gate, whose truth table is give below:

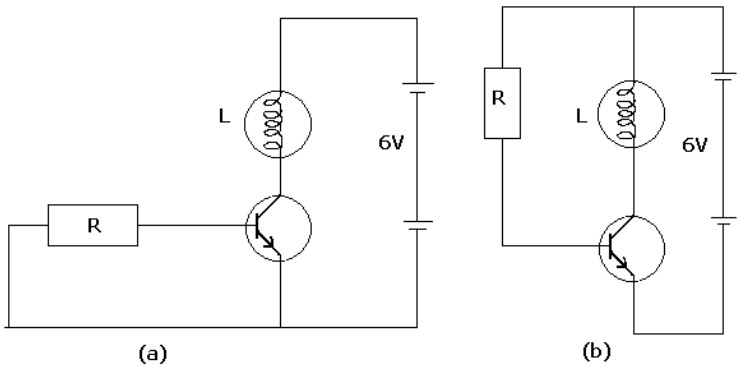
A	B	OUTPUT
0	0	1
0	1	1
1	0	0
1	1	0

If the logic gate is connected to a NOT gate, what will be the output when (i) A =1, B=1 and (ii) A =0, B= 1?

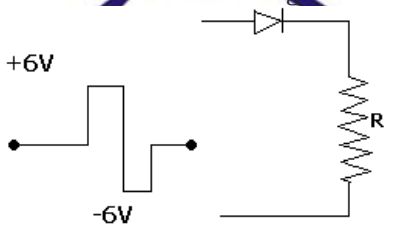
27. Draw the energy band diagram of a p-type semiconductor. How does the forbidden energy gap of an intrinsic semiconductor vary with increase in temperature?
28. Determine the currents through the resistance 'R' of the circuits (i) and (ii), when similar diode D_1 and D_2 are connected as shown below.



29. In only one of the circuits given below the lamp L lights. Which circuit is it? Give reason for your answer.

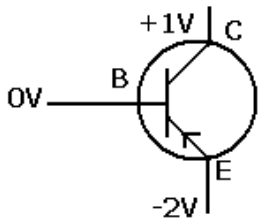


30. What is meant by the term, dopping of an intrinsic semiconductor? How does it affect the conductivity of a semiconductor? How does it affect the conductivity of a semiconductor?
31. If the output of a 2-input NOR gate (i) name the new logic gate obtained (ii) write down its truth table.
32. Draw the logic symbol of 2-input NAND gate. Write down its truth table.
33. Distinguish between n-type and p-type semiconductors on the basis of energy band diagram.
34. The input resistance of a CE amplifier is 2 kΩ and a current gain is 20. If the load resistance is 5kΩ , calculate :
    a. The voltage gain of the amplifier and
    b. The trans-conductance of transistor used.
35. What is an ideal diode? Draw the output wave form across the load resistor R, if the input wave form is as shown in the figure.



36. Write the function of base region of a transistor. Why is this region made thin and slightly doped?
37. Pure silicon at 300K has equal electron and hole concentration of 1.5 X 10^{16} /m^3. Doping by Indium increases the hole concentrations concentration to 4.5 X 10^{22}/m^3. Calculate the new electron concentration in the doped silicon.
38. What do the acronyms 'LASER' and 'LED' stand for? Name the factor which determines (i) frequency, and (ii) intensity of light emitted by LED.
39. Draw a labeled circuit diagram to show the use of a p-n-p transistor as an amplifier in the common –emitter configuration. Also draw frequency response curve for this amplifier.
40. On the basis of the energy band diagrams distinguish between metals, insulators and semiconductors.
41. What is the need of rectification? With the help of a circuit diagram, explain the working of a full wave rectifier. Draw its input and output wave forms.
42. Why the base region of a transistor is usually made thin? In a common- emitter mode of transistor, d.c. current gain is 20, the emitter current is 7mA. Calculate (i) base current and (ii) collector current.
43. A semiconductor has equal electrons and hole concentrations of 2 X 10^8/m^3. On doping with a certain impurity, the hole concentration increases to 4 X 10^{10}/m^3.
    a. What type of semiconductor is obtained on doping?
    b. Calculate the new electron hole concentration of the semiconductor.
    c. How does the energy gap vary with doping?

44. a. With the help of a circuit diagram explain the working of transistor as oscillator.
    b. Draw a circuit diagram for a two input OR gate and explain its working with the help of input, output wave forms.
45. Draw the circuit diagram to show the use of a transistor as an oscillator. State how the positive feedback is provided in the circuit?
46. Explain with the help of a labeled circuit diagram, how an n-p-n transistor can be used as an amplifier in common emitter configuration. Explain how the input and output voltages are out of phase by 180° for a common –emitter transistor amplifier.
47. Why photodiodes used preferably in reverse bias condition? A photodiode is fabricated from a semiconductor with band gap of 2.8eV. Can it detect the wavelength of 6000nm? Justify.
48. In figure given below is (i) the emitter and (ii) collector forward or reverse biased? With the help of a circuit diagram, explain the action of a n-p-n transistor.



49. Draw a circuit diagram of a full wave rectifier and briefly explain its working principle.

In the given circuit diagram two p-n junction diodes D1 and D2 are connected with a resistance R and a d.c battery (E) as shown. Redraw the diagram and indicate the direction of flow of appreciable current in the circuit. Justify your answer.