

# PHYSICS

## QUESTIONS

### Electronic Devices

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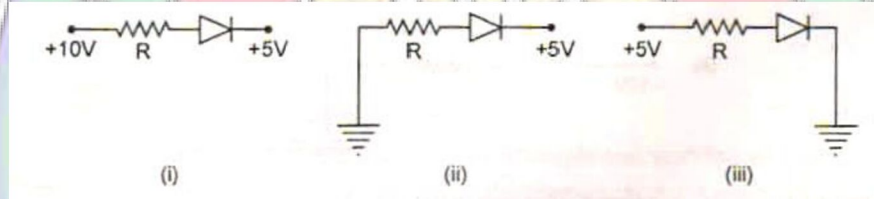
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**VERY SHORT ANSWER QUESTION**

1. What do you mean by valance and conduction bond?
2. What is forbidden energy band ( or band gap ) ?
3. What is the order of band gap  $E_g$  is Ge and Si ?
4. What do you mean by intrinsic and extrinsic semiconductors?
5. What is meant by doping?
6. What is n-type semiconductor?
7. What is p-type semiconductor?
8. What happens to band gap width when doped?
9. What is a p-n junction?
10. What do you mean by drift and diffusion in concern with p-n junction?
11. What do you mean by acceptor and donor energy levels?
12. What do you mean by barrier voltage?
13. What do you mean by depletion lalyer?
14. What is the net charge on (i) an n-type and (ii) p-type semiconductor?
15. What is LED?
16. What is solar cell?
17. What is Zener diode ? Give its symbol.
18. What do you mean by forward and reverse biasing of junction diode?
19. In which of the following circuits the junction diode is reverse biased?



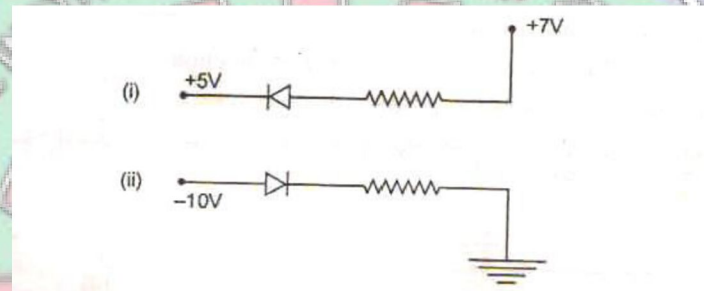
20. What is an ideal diode ?
21. Draw the band diagram of an intrinsic semiconductor.
22. What do you mean by a hole?
23. What are the charge carriers in (i) p-types and (ii) n-types semiconductors ?
24. Name any two intrinsic semiconductors?
25. How will you convert pure germanium into (i) p-type semiconductor and (ii) n-type semiconductor?
26. On what factors does the conductivity of intrinsic semiconductor depend?
27. What is the effect of temperature on intrinsic semiconductor?
28. Draw a symbol of (i) pnp and (ii) npn transistors?
29. What are charge carrier (i) pnp and (ii) npn transistors?
30. Name the fundamental gates.
31. Which gate is said to be the universal gate?
32. Draw the logic symbol of AND gate .
33. Draw the logic symbol of OR gate .
34. Draw the logic symbol of NOT gate .
35. What is amplifier?



36. Why does CE transistor amplifier have higher gain than CB transistor amplifier?
37. What do you mean by logic 0 and 1?
38. What is the phase difference between input and output voltage in CE transistor amplifier?
39. What is rectifier?
40. What is the relation between charge carriers in intrinsic and extrinsic semiconductors?

### SHORT ANSWER QUESTIONS

1. What is the difference between metals, semiconductors and insulators on the basis of band theory of solids?
2. Explain the terms depletion layer and potential barrier in p-n junction.
3. Explain with the help of a circuit diagram, how the thickness of depletion layer in a p-n junction diode changes when it is biased. In the following circuits which one of the two diodes is forward biased and which is reverse biased?

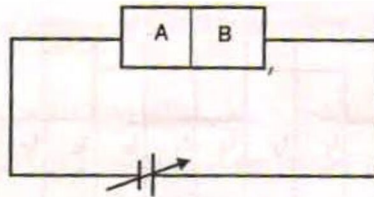


4. Why is npn transistor preferred over pnp transistor?
5. Which of the transistor configuration (i) CB (ii) CE (iii) CC preferred in amplifiers? Give reason.
6. Describe the action of LED.
7. Explain the function of base region of transistor. Why is it made thin?
8. Explain the function of base region of a transistor. Why is it made thin?
9. What should be the biasing of emitter and collector for a transistor to conduct?
10. Define  $\alpha$  and  $\beta$  of a transistor? How are they related?
11. Define voltage gain of an amplifier. Write expression for it in CE amplifier.
12. Draw logic symbol of OR gate. Give its truth table.
13. Draw logic symbol of AND gate. Give its truth table.
14. Draw logic symbol of NOT gate. Give its truth table.
15. Draw a circuit to convert NAND gate alone into an OR gate.
16. Draw a circuit to convert NAND gate alone into an AND gate.
17. Draw a circuit of full wave rectifier? What is the output frequency in full wave rectifier if the input ac signal is frequency of 50 Hz.
18. What is Barkhausen criterion for oscillations?
19. Draw characteristic curve of p-n junction diode in forward and reverse biasing.
20. Draw characteristic curves of Zener diode in forward and reverse biasing.
21. Why is the base region of a transistor made very thin?

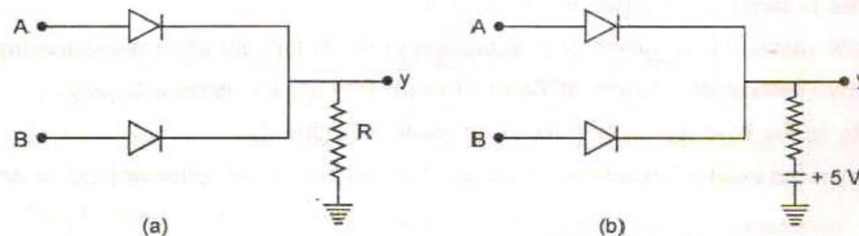
22. Why is the emitter junction in a transistor forward biased and collector junction reverse biased ?

**LONG ANSWER QUESTIONS**

1. What is rectifier? Explain the action of a full wave rectifier giving a labeled circuit diagram.
2. What is Zener diode ? Explain its action as a voltage regulator.
3. Two semiconductor materials A and B shows in figure are made by doping germanium crystal with arsenic and indium respectively. The two are joined end to end and connected to a battery as shown.



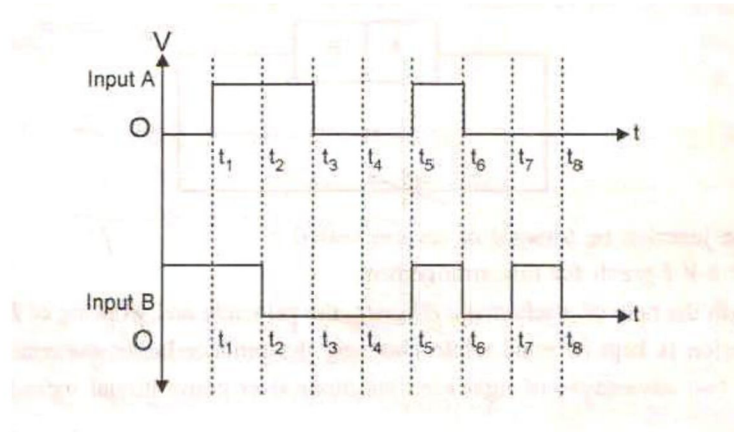
- (i) Will the junction be forward or reverse biased?
  - (ii) Sketch a V-I graph for this arrangement .
4. Explain with the help of a schematic diagram , the principle and working of Light Emitting Diode. What criterion is kept in mind while choosing the semiconductor material for such a device? Write any two advantages of light emitting diode over conventional incandescent lamps.
  5. Explain the operations of pnp and npn transistors.
  6. Define  $\alpha$  and  $\beta$  and find a relation between them.
  7. Draw the circuit diagram of an n-p-n transistor in common-emitter configuration to study its (i) Input and (ii) Output characteristic .Draw the approximate shapes of these characteristics explain how you would find the input and output resistances of the transistor.
  8. Draw a circuit diagram of a CE transistor amplifier and explain its action. Obtain expression for power gain.
  9. What is oscillator? Draw the circuit diagram of an oscillator and explain its action .Write expression for its frequency.
  10. Give the symbol and the truth table of each of two logic gates obtained using two circuit be shown below.



11. What is a NAND gate? Write its truth table . How will you realize (i) AND gate (ii) OR gate (iii) NOT gate , using NAND gate only.



12. Two signals A,B as given below are applied as input to (i) AND (ii) NOR and (iii) NAND gates . Draw the output wave form in each case.



### NUMERICAL QUESTIONS

- The resistivity of pure silicon is  $2300 \Omega\text{-m}$ . The mobilities of electrons and holes in its are  $0.133$  and  $0.48\text{m}^2\text{V}^{-1}\text{s}^{-1}$  respectively. Find its electrons and hole concentrations (Given  $e=1.6 \times 10^{-19}\text{C}$ ).
- When the voltage drops across a p-n junction is increased from  $0.65 \text{ V}$  to  $0.70 \text{ V}$ , the change in the diode current is  $5 \text{ mA}$ . What is the dynamical resistance of the diode?
- The current gain of a transistor in common base arrangement is  $0.98$ . Find the change in collector current corresponding to a change of  $5.0 \text{ mA}$  in emitter current. What should be the change in base current?
- Calculate the current gain  $\beta$  of a transistor if the current gain  $\alpha$  is  $0.98$ .
- What is the change in collector current in a transistor of alternating current gain  $150$ , for a  $150 \mu\text{A}$  change in the base current?
- Find the voltage gain and power gain in a transistor amplifier in common emitter configuration when  $\beta=66$  and the output resistances are  $0.5 \text{ k}\Omega$  and  $50 \text{ k}\Omega$ .
- The input resistances of a silicon transistor is  $66\Omega$ . Its base current is changed by  $15\mu\text{A}$  which results in a change of  $2 \text{ mA}$  in the collector current. The transistor is used as a common emitter amplifier with a load resistance of  $5 \text{ k}\Omega$ . What is the voltage gain of the amplifier ?
- A transistor has current gain of  $50$ . In CE configuration circuit, the load resistance in collector circuit chosen is  $5\text{k}\Omega$  and input resistance is  $1\text{k}\Omega$  and input voltage is  $10 \text{ mV}$ , calculate the output voltage.

Note : if any mistake on this, kindly inform on the mail id :

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Your Observation! Our Correction !!