PHYSICS

BOOKS - CBSE COMPLEMENTARY MATERIAL PHYSICS (HINGLISH)

ELECTRONIC DEVICES

Very Short Answers Questions

1. Name the process involved in the formation of p-n junction diode.

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2. Name three processes involved in the formation of solar cell.

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3. Distinguish between intrinsic and extrinsic semi-conductors on the basis of energy band diagram.

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4. How does the energy gap in an instrinsic semiconductor vary, when doped with a pentavalent impurity and a trivalent impurity. Draw their energy band diagrams.

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5. Which type of extrinsic semiconductors has more mobility and why?

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6. Name the factors which determines (i) frequency and (ii) intensity of light emitted by LED

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7. How does the width of the depletion layer of a p-n junction diode change with decrease in reverse bias?

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8. What is the direction of diffusion current in a junction diode?

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9. Zener diode has higher doping density as compared to ordinary p-n junction diode. How does if effect (i) the width of depletion layer and (ii) the junction field?

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10. How does the height of potential barrier vary with increase in temp

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11. Write the relation between number density of holes and number density of free electrons in an intrinsic semiconductor

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12. Write the value of resistance offered by an ideal diode when (i) forward biased (ii) reverse biased

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13. Write any one use of (i) photodiode (ii) LED.

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14. Why is the semiconductor damaged by a strong current?

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15. Draw I-V characteristic of a solar cell.

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16. What is the direction of diffusion current in a junction diode?

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17. Draw a circuit diagram showing the biasing of a photodiode.

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18. Name the semiconductor device that can be used to regulate an irregulation dc power supply. With the help of I-V characteristics of this device, explain its working.

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19. Name the p-n junction diode which emit spontaneous radiation when forward biased. How do we choose the semiconductor, to be used in those diodes, if the emitted radiation is to be in the visible region?

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20. Name the material used to make a light emitting diode.

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21. A semiconducting device is connected in a series circuit with a battery and a resistance.A current is found to pass through the circuit .If the polarity of the battery is reversed, the current drops to almost zero.The device may be

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22. How does the energy gap of an instrinsic semiconductor vary, when doped with a pentavalent impurity?

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23. What is the order of energy gap in a conductor, semiconductor and insulator

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24. The ratio of number density of free electrons to holes for two different materials, A and B, are (i) equal to one and (ii) less than one respectively. Name the type of semiconductor to which A and B belong. Draw energy level diagram for A and B.

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Short Answer Questions 2 Marks

1. If the frequency of the input signal is f. What will be the frequency of the pulsating output signal in case of:

(i) Half wave rectifier?

(ii) full wave rectifier?

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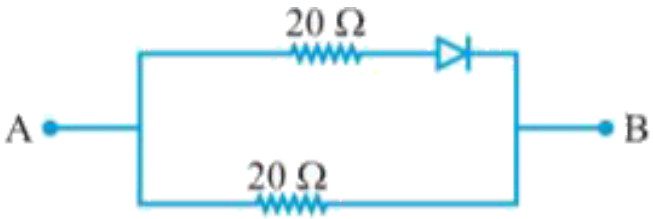
2. Find the equivalent resistance of the network shown in figure between point A and B when the p-n junction diode is ideal and:

(i) A is at higher potential.

(ii) B is at higher potential



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3. Can the potential barrier across a $p-n$ junction be measured by simply connecting a voltmeter across the junction ?

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4. Diode is a non linear device. Explain it with the help of a graph.

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5. A n-type semiconductor has a large number of free electrons but still is electrically neutral. Explain.

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6. (a) In the following diagram 'S' is a semiconductor . Would

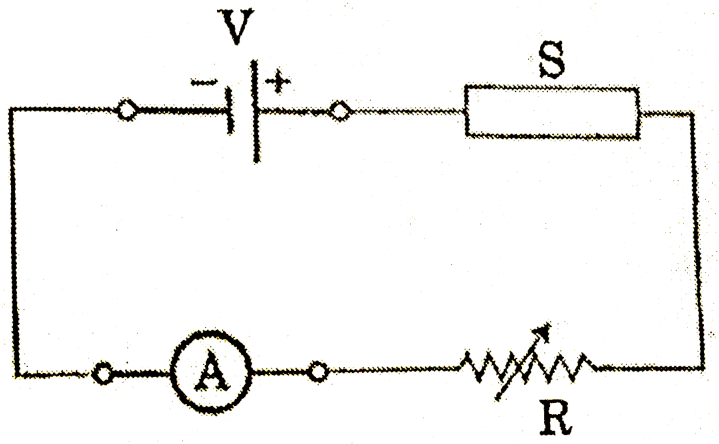
you increase or decrease the value of R to keep the

reading of the ammeter A constant when S is heated ?

Given reason for you answer .

(b) Draw the circuit diagram of photodiode and explain

its working . Draw its I-V characteristics.



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7. What are the characteristics to be taken care of while doping a semiconductor? Justify your answer.

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8. 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.

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9. What is the location of donor energy levels in the energy band diagram of n-type semiconductor.

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10. Show the acceptor energy level in energy band diagram of p-type semiconductor.

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11. What is the value of knee voltage in

(a) Ge junction diode.

(b) Si junction diode.

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12. Describe the working principle of a solar cell. Mention three basic processes involved in the generation of emf.

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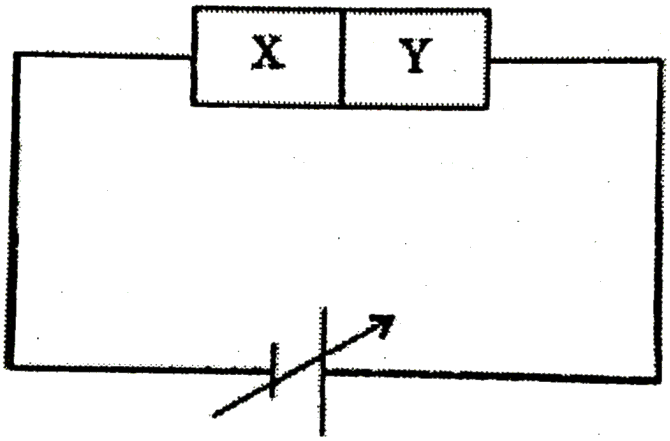
13.



Two semiconductor materials X and Y shown

in the given figure, are made by doping germanium crystal with indum and arsenic respectively. The two are joined end to end and connected to a battery as shown.

(i). Will the junction be forward biased or reverse biased.?

(ii). Sketch a V-I graph for this arrangement.

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Short Answer Questions 3 Marks

1. What is depletion region in p-n junction diode. Explain its formation with the help of a suitable diagram.

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2. What is rectification? With the help of labelled circuit diagram explain half wave rectification using a junction diode.

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3. (a). Explains briefly with the help of a circuit diagram how V-I characteristics of a p-n junction diode are obtainedin (i) forward bias, and (ii) reverse bias.

(b). A photo diode is fabricated from a semiconductor with a band gap of 2.8 EV. Can it detect wave length of 6000. nm? Justify.

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4. What is p-n junction? How is a p-n junction made? How potential barrier is caused in it.

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5. Give three differences between forward bias and reverse bias.

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6. Show the biasing of a photodiode with the help of a circuit diagram. Draw graphs to show variation in reverse bias current for different illumination intensities.

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7. p-type and n-type semiconductors .

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Long Answer Questions 5 Marks

1. What is a p-n junction diode? Define the term 'dynamic resistance' for the junction diode. With the help of a circuit diagram

explain the working of a p-n junction diode as a full wave rectifier.

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Numericals

1. In a p-n junction, width of depletion region is 300 nm and electric field of $7 \times 10^5 V/m$ exists in it.

(i) Find the height of potential barrier.

(ii) What should be the minimum kinetic

energy of a conduction electron which can diffuse from the n-side to the p-side?

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2. An LED is constructed from a p-n junction based on a certain semi-conducting material whose energy gap is 1.9 eV. Then, the wavelength of the emitted light is

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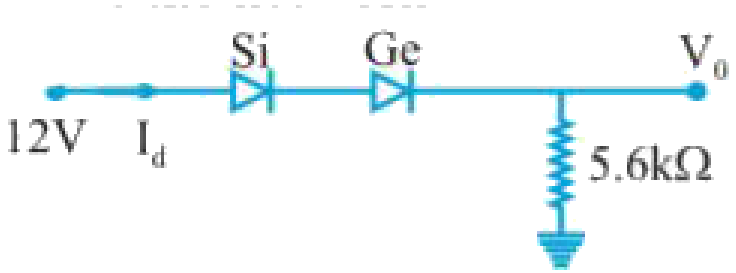
3. Determine V_0 and I_d for the network.



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4. A p-n junction is fabricated from a semiconductor with band gap of $2.8eV$. Can it detect a wavelength of $6000nm$?

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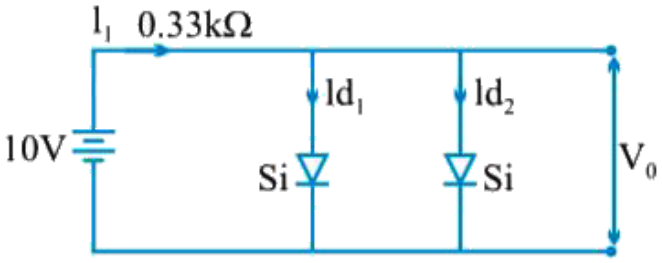
5. Determine V_0, I_{d1} and I_{d2} for the given network. Where D_1 and D_2 are made of silicon.



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6. Pure Si at 300 K has equal electron (n_e) and hole (n_h) concentrations of $1.5 \times 10^{16} m^{-3}$

doping by indium increases n_h to $4.5 \times 10^{22} m^{-3}$. Caculate n_e in the doped Si-

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7. The solar radiation spectrum shows that maximum solar intensity is near to energy hv = 1.5 eV. Answer the following:

(i) Why are SI and GaAs are preferred materials for solar cells.

(ii) Why CdS or CdSe are preferred materials for solar cells.

(iii) Why we do not use materials like PbS (Eg ~ 0.4 eV).

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