REVISION MATERIAL FOR CLASS XII

SUBJECT: PHYSICS

I hope this collection of questions will help to test your preparation level and useful to recall the concepts in different areas of all the chapters.

Use and Succeed.

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"IT IS NOT ENOUGH TO AIM, YOU MUST HIT"

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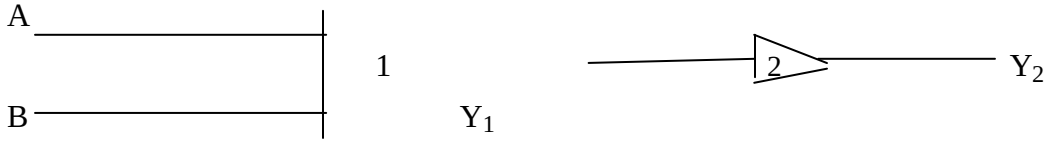
SOLIDS AND SEMICONDUCTOR DEVICES

1. Give an account of the formation of energy bands in solids. What is their significance ?
2. Distinguish between conductors, semiconductors and insulators in terms of band theory of solids.
3. How is a p-type semiconductor formed? Draw the energy band diagram of a p type semiconductor. Deduce an expression for the conductivity of a p-type semiconductor.
4. What changes are expected in the majority to minority charge carriers ratio as the temperature of an extrinsic semiconductor is raised?
5. An n-type semiconductor has a large number of free electrons but still it is electrically neutral. Comment.
6. In a p-n junction, why electrons do not keep on flowing from the n-region to the p-region?
7. What is a Zener diode? Explain (i) Zener breakdown (ii) avalanche breakdown. Explain use of zener diode as a voltage regulator.
8. In a practical transistor, can we interchange the emitter and collector ? Give reasons in support of your answer.
9. What happens in a transistor when both emitter and collector are reverse biased. What is this condition known as ?
10. What does the equation Y=A+B represent in Boolean algebra?
11. Why do we call the NAND gate as the "universal gate"? How many NAND gates are required to fabricate (i) OR gate (ii) AND gate (iii) NOT gate.
12. If an output of a two input NAND gate is fed as the input to a NOT gate (i) name the new logic gate obtained and (ii) write down its truth table.
13. . Identify the logic gate 1 and 2 in the logic circuit given below. Also write the table for the final output for all possible combinations of the inputs A and B.



14. When the voltage drop across a p-n junction diode is increased from 0.65 V to 0.70 V, the change in the diode current is 5 mA. What is the dynamic resistance of the diode ?
15. A p-n photodiode is fabricated from a semiconductor with a band gap of 2.8 eV. Can it detect a wavelength of 6000 nm ? Justify.
16. Is the ratio of number of holes to the number of conduction electrons in an n type extrinsic semiconductor less than one, equal to one or greater than one ?
17. A semiconductor has equal electron and hole concentration of 6×10^8 /m^3. On doping with certain impurity, electron concentration increases to 9×10^{12} /m^3. (i) identify the new semiconductor obtained after doping. (ii) Calculate the new hole concentration.
18. In the working of a transistor emitter base junction is forward biased while collector base junction is reverse biased. Why?
19. The input resistance in the common emitter amplifier circuit of a given transistor has a value of 1.5kΩ.The output of this circuit is obtained across a collector resistance of 7.5 kΩ What would be the output voltage, corresponding to an input voltage of 5 mV, if the current amplification factor, of this transistor has a value of 60 ?
20. With the help of a labeled circuit diagram explain the use of a transistor as an oscillator.

COMMUNICATION SYSTEMS

1. What is a communication systems? Give a brief description of the major components of a communication systems?
2. Define the terms modulation. Name three different types of modulation used for a message signal using a sinusoidal continuous carrier wave.
3. Explain the working of a Diode as a demodulator.
4. Why is an FM signal less susceptible to noise than an AM signal?
5. What is discrete signal? Explain briefly how an analog signal can be converted into a digital signal. Enumerate some of the advantages of digital communication.
6. What is twisted pair and how is it employed for line communication? Discuss its advantages and limitations.
7. Why is the transmission of signals through a coaxial cable not possible for frequencies greater than 20 MHz ?
8. Give two main advantages of optical communication. State two special characteristics of (i) light source and (ii) detector used in optical communication.
9. Explain briefly the principle of transmitting signals using a satellite. State two main advantages of using a satellite for transmitting signals.
10. Name the device used for data transmission from one computer to another. Justify the name . Using this device, draw the block diagram for data communication and explain it briefly.
11. Explain the terms (i) spontaneous emission (ii) stimulated emission and (iii) population inversion.
12. Distinguish between FAX and e-mail.
13. Name of the type of communication corresponding to the case where the signal is
    (i) a continuous signal essentially similar to the message of information.
    (ii) a discrete and binary coded versions of the message or information.
14. Long distance broadcast use short wave band. why?
15. What should be the length of a dipole antenna for a carrier wave having frequency 3 x 10^8 Hz.
16. What is pulse modulation ? With the help of diagrams differentiate between PAM and PDM.
17. Give one reason, why pulse code modulation (PCM) is preferred in transmitting signals.
18. What is remote sensing ? Briefly explain how is it carried out. Mention its any two applications
19. Explain how the optical communication system offers the possibility of millions of channels with increased bandwidth. Give an additional advantage of optical communication system over a system employing a co-axial cable.
20. Explain two major characteristics of the detector used in an optical communication system. Name two such detectors.
21. Why are infra red waves perfect for optical communication ?
22. Describe how does LASER work ? How is light from a LASER different from that of LED ?

23. Mention the frequency range at which T.V signals are transmitted. Derive an expression for the range up to which signals can be transmitted by a T.V tower.
24. A ground receiver antenna is receiving a signal at (a) 5 MHz and (b) 100 MHz, transmitted from a ground transmitter at a height of 300m located at a distance of 100km from the receiver station. Identify whether the signal is coming via surface wave, sky wave propagation or satellite transponder.
    Radius of earth = 6400km. N_{max} of ionosphere $=10^{12}/\ m^3$
25. A microwave telephone link operating at the central frequency of 10 GHz has been established. If 20% of this is available for microwave communication channel, then how many telephones channel can be simultaneously granted if each telephone is allotted a bandwidth of 8 KHz.

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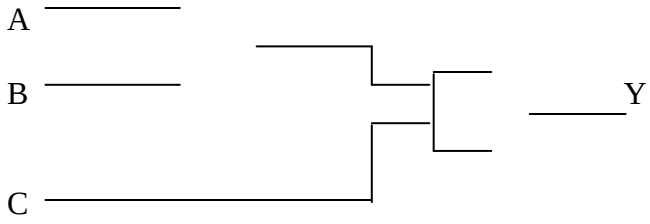
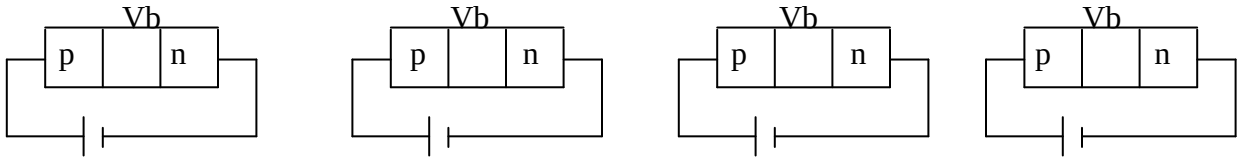
Solids & S.C Devices

1. An N-type semi-conductor is
   (a) negatively charged
   (b) positively charged
   (c) negatively or positively charged depending upon the amount of impurity
   (d) neutral
2. NPN transistors are preferred to PNP transistors, because they have,
   (a) low cost
   (b) low dissipation of energy
   (c) electrons have high mobility than holes and hence high mobility of energy.
   (d) capable of handling power
3. To get an output Y = 1 from circuit of fig., the input must be

	A	B	C
(a)	0	1	0
(b)	1	0	0
(c)	1	0	1
(d)	1	1	0



4. In a full wave rectifier with input frequency 50 Hz, the ripple in the output is mainly of the frequency (in Hz)
   (a) 125 (b) 100 (c) 50 (d) none of these
5. In the case of forward biasing of p-n junction, which one of the following figures correctly depicts the direction of flow of carriers?



(a) (b) (c) (d)

6. In an N-P-N transistor circuit, the collector current is 10mA. If 90% of the electrons emitted reach the collector, the
   (a) emitter current will be 9mA
   (b) base current will be 10μA
   (c) base current will be 0.1mA
   (d) emitter current will be 11Ma
7. If the forward voltage in a diode is increased, the width of the depletion layer will
   (a) decrease (b) increase (c) no change
   (e) increase proportional to the applied voltage.

8. In a common emitter amplifier, the ratio of power gain to voltage gain is equal to

(a) $\frac{I_E}{I_B}$ (b) $\frac{I_C}{I_B}$ (c) $\frac{I_B}{I_E}$ (d) $\frac{I_B}{I_C}$

9. The mobility of conduction electrons is greater than that of holes for the reason that, they

(a) are negatively charged (b) are lighter
(b) require less energy for moving through crystal
(d) experiences a lesser number of collisions

10. The truth table shows below is for which of the following gates?

A	**B**	**Y**
1	1	0
1	0	1
0	1	1
0	0	1

(a) NAND (b) AND (c) OR (d) NOT

11. The part of a transistor, which is heavily doped to produce a large number of majority carriers is

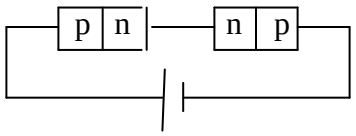
(a) base (b) emitter (c) collector (d) none of these

12. An oscillator is nothing but an amplifier with

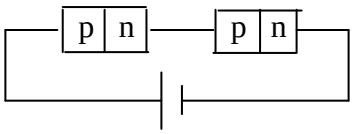
(a) large gain (b) positive feedback (c) no feedback (d) negative feedback

13. Two identical p-n junctions may be connected in series with a battery in three ways as shown in the figure. The potential drop across the p-n junctions are equal in

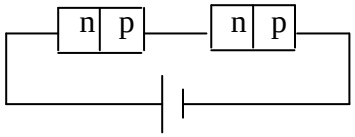
(i)



(ii)



(iii)



(a) Circuit (i) and circuit (ii)
(b) Circuit (ii) and circuit (iii)
(c) Circuit (iii) and circuit (i)
(d) Circuit (i) only

14. Television signals broadcast from the moon can be received on the earth while the TV signals broadcast from Chennai cannot be received at places about 300 km distant from Chennai, because

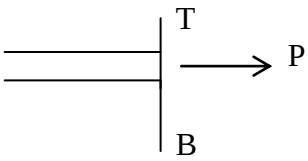
(a) there is no atmosphere around the moon (b) of strong gravity effect on TV signals
(c) the TV signals travel straight and cannot follow the curvature of the earth
(d) there is atmosphere around the earth

15. The following symbol represents

(a) NAND gate (b) OR gate (c) NOT gate (d) AND gate

16. Laser rays are
    (a) highly coherent rays (c) instrument to measure intensity of x-rays
    (b) measure of frequency (d) instrument to measure velocity of aeroplane

17. The figure shows a half-wave aerial TB.
Which statement in a to d is correct?



    (a) The top T is a current antinode
    (b) The radio wave transmitted from this aerial is mainly in the direction of P
    (c) A progressive radio wave is set up along TB.
    (d) If the radio wavelength transmitted is 50.0 m, the length of TB is 12.5 m.

18. Communications lasers are likely to be used with optical fibres, rather than in open links, to
    (a) reduce the attenuation in the transmission channel.
    (b) ensure that the beam does not spread.
    (c) prevent interference by other lasers.
    (d) prevent atmospheric interference.

19. Indicate which one of the following modulations is digital in nature?
    (a) pulse – amplitude modulation (c) pulse – code modulation
    (b) pulse – time modulation (d) pulse – width modulation

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