Benha University
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Sheet 1

1. Optoelectronic devices works on _____.
a) Light
b) electrical current
c) Both A and B
d) None of the above

2. Which among the following devices work on the basis of photo-voltaic effect?
a) Photo-diode
b) LED
c) LCD
d) None of the above

3. The transducer used in television transmission works on the principle of _____.
a) Electromagnetic Induction
b) Photoelectric effect
c) Rayleigh's effect
d) None of the above

4. Important applications of optoelectronics are
a) Optocoupler
b) Optical fiber communications
c) Both A and B
d) None of the above

5. _____ is an electronic component that transfers electrical signals between two isolated circuits by using light.
a) Phototube
b) Photocoupler
c) Photodiode

d) None of the above

6. A _____ is a device that converts incident photons into an electrical signal.
a) Photomultiplier
b) Photocoupler
c) Photodiode
d) None of the above

7. A cell is an electronic device that directly converts sun's energy into electricity.
a) photo-voltaic
b) photocoupler
c) photodiode
d) None of the above

8. Light-emitting diode is a _____ semiconductor diode.
a) P-P
b) P-N
c) N-N
d) None of the above

9. _____ is a source of highly monochromatic, coherent and directional light.
a) LED
b) Laser Diodes
c) Both A & B
d) None of the above

10.The term optoelectronics is a specific discipline of electronics that focuses on light-emitting or light-detecting devices.
a) True
b) False

11.Is solar cell an optoelectronic device?
a) Yes
b) No

12._____ is the science and technology of generating, controlling, and detecting photons, which are particles of light.
a) Photoelectronics
b) Photonics
c) Optonic
d) None of the above

13.How does light travel through the cable?
a) Refraction and Reflection
b) Refraction only
c) Dispersion
d) Total Internal Reflection

14.Velocity of light in free space
a) increases linearly
b) remains constant
c) decreases
d) increases exponentially

15.In a phototransistor, the base current is .....
a) Set by a bias voltage
b) Directly proportional to light
c) Inversely proportional to light
d) Square to light intensity

16.The general condition for a phototransistor is .....
a) Common base configuration
b) Common collector configuration
c) Common emitter configuration
d) Darlington-pair configuration

17.Emission of light in an LED results due to .....
a) Emission of electrons
b) Photovoltaic effect
c) Generation of electromagnetic radiation
d) Conversion of heat to electrical energy

18.The combined package of LED and a photodiode is known as
a) Optocouplers
b) Opto isolator
c) Optically coupled isolator
d) All of the above

19.To display the digit 8 in a seven-segment indicator
a) C must be lighted
b) G must be off
c) F must be on
d) All segments must be lighted

20.LEDs can be fabricated using
a) silicon
b) Germenium
c) Carbon
d) GaAs

21.The colour of LED depends on
a) type of the semiconductor
b) polarity of voltage
c) intensity of current
d) strength of magnetic field

22.A Device which converts light energy into electrical energy is called
a) LED
b) Photodetector
c) LASER
d) DISPLAY

23.CRT is found in LED Tvs
a) Yes b) No

problems:

(1) If the accelerating voltage in an electron gun of CRO is 3 kV, what is the kinetic energy of the electrons in the beam?

KE = eV

$KE = 1.6 \times 10^{-19} \times 3000$

$KE = 4.8 \times 10^{-16}$ J

(2) What is the velocity of an electron that has been accelerated by the 2.5 kV anode voltage of a television picture tube?

The charge on an electron is 1.6×10^{-19} C

The mass of an electron is 9.1×10^{-31} kg

KE = eV

$KE = 1.6 \times 10^{-19} \times 2500$

$KE = 4.0 \times 10^{-16}$ J

$KE = \frac{1}{2} mv^2$

$4.0 \times 10^{-16} = 0.5 \times 9.1 \times 10^{-31} \times v^2$

$4.0 \times 10^{-16} = 4.55 \times 10^{-31} \times v^2$

$\frac{4.0 \times 10^{-16}}{4.55 \times 10^{-31}} = v^2$

$8.79 \times 10^{14} = v^2$

$V = 29649973$ m/s (2.96×10^7 m/s)

(3) 2.2×10^{14} electrons reach the anode per second in CRO. What is the current?

I = N q

$I = 2.2 \times 10^{14} \times 1.6 \times 10^{-19}$

I = 0.0000352 A

Or **$I = 3.52 \times 10^{-5}$ A**

(4) The acceleration voltage between the cathode and anode is 8000 V. Calculate the kinetic energy of one electron when it has reached the anode.

Charge on 1 electron $e = 1.6 \times 10^{-19}$C

KE = eV

$KE = 1.6 \times 10^{-19} \times 8000$