

SHORT QUESTIONS

16.1 Thermionic Emission

1.6.2 Investigating the properties of Electrons

16.3 Cathode-Ray Oscilloscope (C.R.O)

(1) Define electronics.

Ans: The branch of applied physics which deals with the behaviour of electrons using different device for various useful purposes is known as electronics

(2) What do you understand by thermionic emission?

Ans: Thermionic Emission

The process of emission of electrons from the hot metal surfaces is called thermionic emission.

(3) What happens when a narrow beam of electrons is passed through a uniform electric field? What is its reason?

Ans: We can set up electric field by applying a potential difference across two parallel metal plates placed horizontally separated with some distance. When an electron beam passes between the two plates, it can be seen that the electrons are deflected towards the positive plate (Fig. 16.1). The reason for this is that electrons are attracted by the positive charges and repelled by the negative charges due to force $F = qE$. The degree of deflection of electrons from their original direction is proportional to the strength of the electric field applied.

(4) What is the function of electromagnetism in television?

Ans: Electromagnets are used to deflect electrons to the desired positions on the screen of a television tube.

(5) What happens when a narrow beam of electrons is passed through a uniform magnetic field.

Ans: Deflection of Electrons by Magnetic Field

We apply magnetic field at right angle to the beam of electrons by using a horse-shoe magnet as shown in fig. We will notice that the spot of the electrons beam on the screen is getting deflected from its original direction. Now change the direction of horse-shoe magnet. We will see that spot on the fluorescent screen is getting deflected in the opposite direction.

(6) When and who discovered electrons?

Ans: In the 1950's physicists started to examine the passage of electricity through a vacuum tube. Some kind of rays were emitted from the cathode or the negative electrode, the rays were called cathode rays. J.J Thomson in 1897 observed the deflection of cathode rays by both electric and magnetic field. From these deflection experiments he concluded that cathode rays must carry a negative charge. These negatively charged particles were given the name of electrons.

(7) What is meant by thermionic emission?

Ans: Definition:

"The process of emission of electrons from the hot metal surfaces is called thermionic emission."

(8) How thermionic emission is produced?

Ans: Metals contain a large number of free electrons. At room temperature electrons cannot escape the metal surface due to attractive forces of atomic nucleus. When the metal is heated to a high temperature. Some of the free electrons may gain sufficient energy to escape the metal surface.

(9) What is Cathode – Rays Oscilloscope (C.R.O)?

Ans: The Cathode – ray oscilloscope is an instrument which is used to display the magnitudes of changing electric currents or potentials as shown in fig.

The information is displayed on the screen of a “cathode ray tube.” This screen appears a circular or rectangular window usually with a centimeter graph.

Examples:

Picture tube in our TV set and the display terminal for most computers are cathode ray tubes.

(10) Describe function of the electron gun

Ans: The electron gun consists of an electron source which is an electrically heated cathode that ejects electrons. Flow of the electrons in the beam is controlled by an electrode called grid ‘G’. The grid is connected to the negative potential. The more negative this potential. The more electrons will be repelled from the grid and hence fewer electrons will reach the anode and the screen. The number of the electrons reaching the screen determines. The brightness on the screen light. Hence the negative potential of the grid can be used as a brightness control. The anode is connected to the positive potential and hence is used to accelerate the electrons. The electrons are focused into a fine beam as they pass through the anode.

(11) Write down uses of CRO

The CRO is used in many fields of science, some uses are given below:

- i. Displaying wave forms.
- ii. Measuring voltages.
- iii. Range finding (as in radar)
- iv. Echo – sounding (to find the depth of sea – beds).
- v. To display heart beats.

(12) How glow is produced in the tube?

Ans: The glow in the tube is due to the circular motion of electrons in the magnetic field. The glow comes from the light emitted from the excitations of the gas atoms in the tube.

16.4 Analogue and Digital Electronics

16.5 Basic Operations of Electronic-Logic Gates

(13) Explain the difference between analogue and digital electronics.

Ans:

Analogue electronics	Digital electronics
The branch of electronics consisting of such circuits which process the analogue quantities (continuously vary) is called analogue electronics. Examples: <ul style="list-style-type: none">• Amplifier• Electric iron• Refrigerator	The branch of electronics consisting of circuits which process the data being provided in the form of maximum and minimum voltage signals is known as digital electronics. Examples: <ul style="list-style-type: none">• Computer• Digital camera• Mobile phone

(14) Name five analogue and five digital devices that are commonly used in everyday life.

Ans:

Analogue devices	Digital devices
(i) Electric iron	(i) Computer
(ii) Electric fan	(ii) Calculator
(iii) Radio receiver	(iii) Digital camera
(iv) Refrigerator	(iv) Mobile phone
(v) Washing machine	(v) Security system
(vi) Microphone	(vi) Fire alarm

(15) Name five analogue and five digital devices that are commonly used in everyday life?

Ans: **Analogue devices**

Analogue devices used in our everyday life are:

- Radio receiver
- Washing machine
- Public address system
- Electric lamp
- Refrigerator
- Electric motor

Digital devices

Digital devices used to everyday life are

- Burglar alarm
- Mobile phones
- Digital camera
- Radar
- Computer

(16) Write the brief importance of digital electronics?

Ans: Most of today's technologies fall under the classification of digital electronics. Digital electronics device store and process bits electrically which help user fastly.

(17) What is bit and byte?

Ans: A bit represents data using 1' and 0's.
8 bits is equal to 1 byte.

(18) What is digitization?

Ans: Digitization is the process of information into 1's and 0's.

(19) Define logic operation and logic gates

Logic operation

The various operations of Boolean variables are called as logic operations because the various variables used in subject of logic also possess two values. The word "truth" has also been borrowed from this subject.

Logic gates

In digital electronics, the 0 and 1 values of the variables are simulated by two different levels of the potential. Usually 0 is represented as zero or ground potential and 1 by 5 volts or by any other suitable voltage. Then such circuits have been designed which implement the various logic operations. These circuits are known as logic gates.

16.6 AND Operation

16.7 OR Operation

(20) Which of the following gates would have 1 as output.



Answer: a and d

(21) Define OR operation.

"OR operation to be that in which the output has a value 1 when at least one of its inputs is at 1. The output is 0 only when all the inputs are 0".

(22) Write down Truth table of OR gate

Truth table of OR operation

B	A	$X = A + B$
0	0	0
0	1	1
1	0	1
1	1	1

(23) Define AND operation

AND operation is such a logic operation that its output is 1 only when all the values of its inputs are 1."

(24) Write down Truth table of OR gate

Truth table of AND operation

Truth table shows all the values of the input variables and the value of output for each set of the values of the inputs. By using the sign of AND operation, the various lines of the truth table are shown in table.

B	A	X
0	0	0
0	1	0
1	0	0
1	1	1

16.8 NOT Operation

16.9 NAND Gate

(25) Define NOT Gate

"An operation after which the Boolean variable changes its state and acquires the second possible state is known as NOT operation".

(26) Write down Truth table of NAND gate

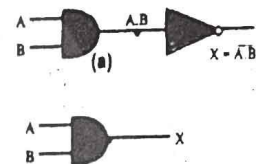
Truth table

Truth table of NOT operation is given in table.

A	\bar{A}
0	1
1	0

(27) Define NAND Gate

A NAND gate is formed by coupling a NOT gate with the output terminal of an AND gate. NAND gate is shown in Figure. The NOT gate inverts the output of the AND gate.



(28) Write down Truth table of NAND gate

Truth table of NAND gate

Table given is the truth table of NAND gate. In each line of this table, the value of the output has been obtained by inverting the value of the output of the AND gate corresponding to that line.

B	A	$X = \overline{A.B}$
0	0	1
0	1	1
1	0	1
1	1	0

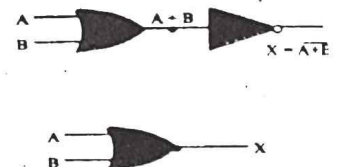
16.10 NOR Gate

16.11 Uses Of Logic Gates

(29) Define NOR Gate.

Ans:

A NOR gate is formed by coupling the output of OR gate with a NOT gate. NOR gate is shown in Figure. This NOT gate inverts the output $A+B$ of the OR gate.



(30) Write down Truth table of NOR gate

Truth table of NOR gate

Given table is the truth table of NOR gate. In this table, the value of output has been written by inverting the output of OR gate.

B	A	$X = \overline{A+B}$
0	0	1
0	1	0
1	0	0
1	1	0