

Chapter 1 - Electronic Components & Signals

(Weightage - 12 Marks)

2 Marks Questions

1. Draw the symbols of resistor. State the unit of measurement of resistance.

Answer:

Symbols of resistor:

Fixed



Variable



Unit of resistance: Ohm

2. Define resistor and draw symbol of variable resistor.

Answer:

Resistor: A resistor is an electrical component that limits or regulates the flow of electrical current in an electronic circuit.

Symbol of variable resistor:



3. Draw the symbol of inductor and capacitor. State the unit of inductor and capacitor.

Answer:

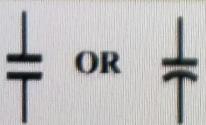
Symbol of inductor:



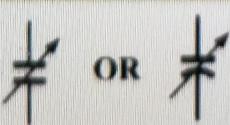
OR

Unit of Inductance: Henry OR H

Symbol of capacitor:



OR



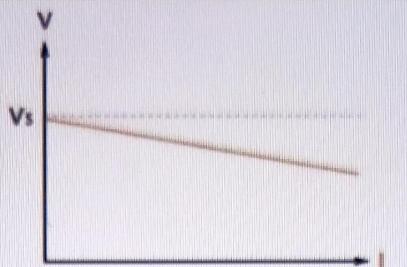
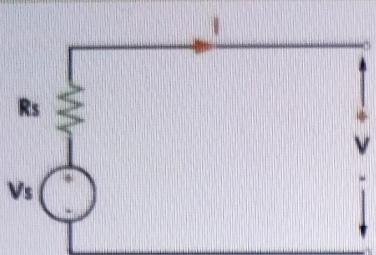
OR

Unit of capacitance: farad OR F

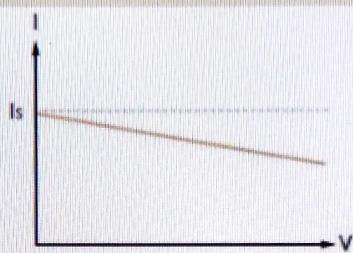
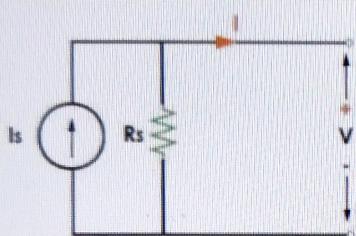
4. With suitable graph, define voltage source & current source.

Answer:

- 1) Voltage source:** A voltage source is a device that creates a voltage difference between its two terminals.



- 2) Current source:** A current source is a device that creates a current flowing through its terminals



5. List the types of signals.

Answer:

Types of signals:

- 1) Analog signal
- 2) Digital signal
- 3) AC signal
- 4) DC signal

6. Define: amplitude and frequency.

Answer:

- 1) Amplitude:** The maximum value (positive or negative) attained by an alternating quantity is called its amplitude or peak value.

The amplitude of an alternating voltage or current is designated by V_m or I_m .

- 2) Frequency:** The number of cycles that occurs in one second is called the frequency (f) of the alternating quantity. It is measured in cycles/sec or Hertz(Hz)

7. Define active components and passive components.

OR

Distinguish between active components and passive components.

Answer:

- 1) Active components:** A circuit component which can deliver power or power gain in an electric circuit for infinite duration of time is known as active component.

Active components behave as source of power in the circuit.

2) **Passive components:** A circuit element which only absorbs the power and convert it in heat or stores in electric field or magnetic field is known as passive component.

The passive components act as load in the circuit

8. Give different types of IC.

Answer:

- 1) Analog IC
- 2) Digital IC
- 3) Thin and thick film ICs
- 4) Monolithic ICs

9. State the two advantages and disadvantages of integrated circuits.

OR

State the advantages of integrated circuits over circuits with discrete components. (4 Marks)

Answer:

Advantages of Integrated circuits:

- 1) Small in size due to the reduced device dimension.
- 2) Low weight due to very small size.
- 3) Low cost due to large-scale production
- 4) Increased response time and speed.

Disadvantages of Integrated circuits:

- 1) IC resistors have a limited range.
- 2) Generally inductors cannot be formed using IC.



4 Marks Questions

10. Determine the value of resistance with the following colour code:

- (i) Red, Red, Orange, Gold
- (ii) Brown, Black, Black, Silver

Answer:

- (i) Red, Red, Orange, Gold

Red ↓ 2	Red ↓ 2	Orange ↓ $\times 1000$	Gold ↓ $\pm 5\%$
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$$= 22 \times 1000 \pm 5\%$$

Value of resistor is 22 K Ω + 5% OR 22000 Ω + 5%

- (ii) Brown, Black, Black, Silver

Brown ↓ 1	Black ↓ 0	Black ↓ $\times 1$	Silver ↓ $\pm 10\%$
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$$= 10 \times 1 \pm 10\%$$

Value of resistor is 10 Ω $\pm 10\%$

11. Determine the value of capacitance with the following colour code.

- (i) Orange, Orange, Blue
- (ii) Yellow, Violet, Yellow

Answer:

- (i) Orange, Orange, Blue

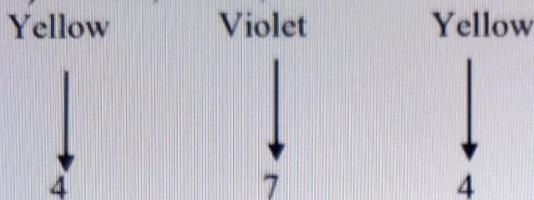
Colour coding:

Orange	Orange	Blue
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Value of capacitor: $33 \times 10^6 \text{ pF}$
 $= 33 \times 10^6 \times 10^{-12} \text{ F}$
 $= 33 \times 10^{-6} \text{ F}$
 $= 33 \mu\text{F}$

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ii) Yellow, Violet, Yellow

Value of capacitor :

$$47 \times 10^4 \text{ pF}$$

$$= 470 \text{ KpF}$$

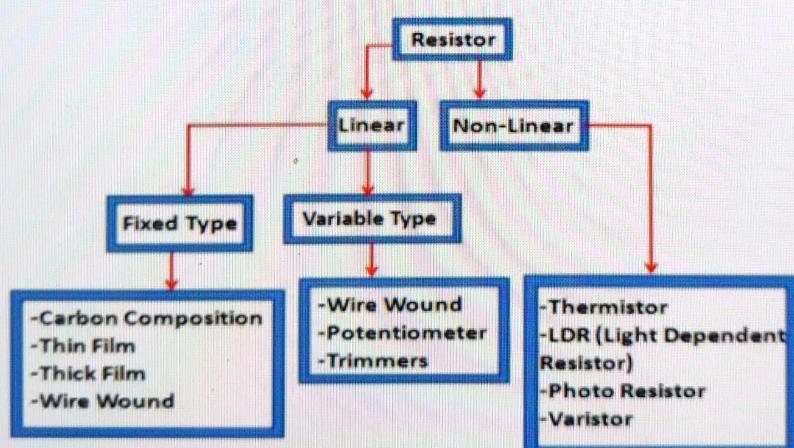
OR

$$= 47 \times 10^4 \times 10^{-12} \text{ F}$$

$$= 47 \times 10^{-8} \text{ F}$$

$$= 0.47 \mu\text{F}$$

- 12. State the different types of resistors. State any four specifications of resistors.**

OR**List any four specifications of resistors. (2 Marks)****Answer:****Different types of Resistors:-****Specifications of resistors:**

- 1) Resistivity
- 2) Tolerance
- 3) Power Rating
- 4) Thermal Stability

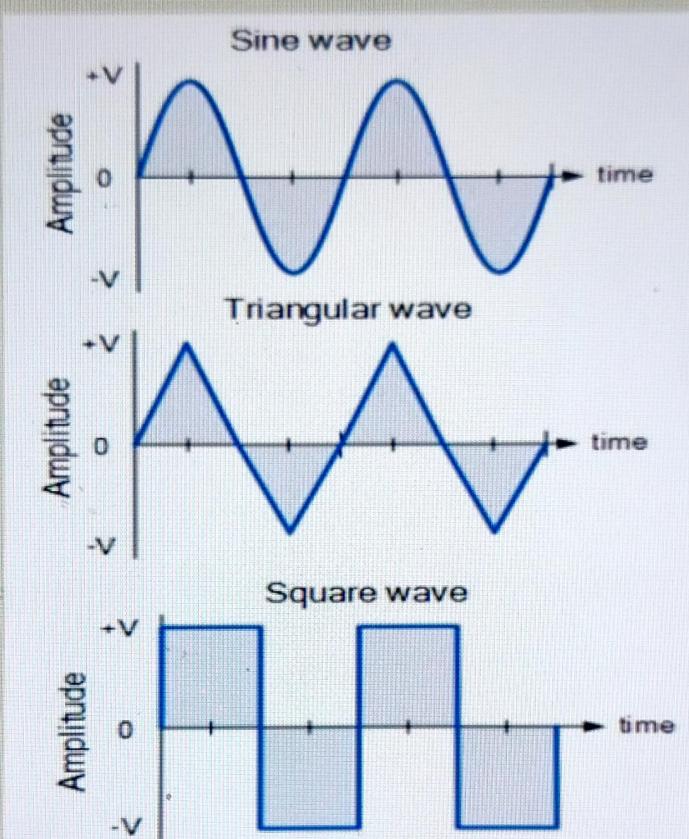
13. State different types of electrical signal and draw all types of waveforms.

Answer:

Types of electrical signals:

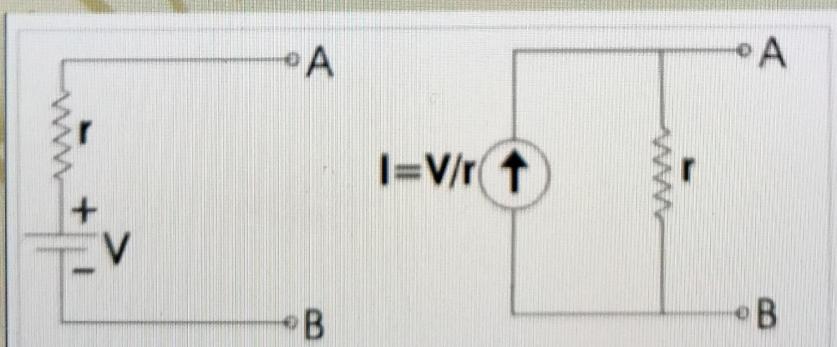
- 1) Sine wave
- 2) Triangular wave
- 3) Square wave

Waveforms:



14. With the help of circuit diagram describe conversion of VG. Source to current source.

Answer:



- 1) Any practical voltage source or simply a voltage source consists of an ideal voltage source in series with an internal resistance or impedance.

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- 2) The voltage and current source are mutually transferable i.e. voltage to current source
- 3) Left figure represents a practical voltage source in series with the internal resistance r while right figure represents a practical current source with parallel internal resistance r
- 4) Therefore, for any practical voltage source, if the ideal voltage be V and internal resistance be r , the voltage source can be replaced by a current source I (i.e v/r) with the internal resistance(r) in parallel with the current source as shown.

6 Marks Questions

15. State the applications and specification of

- (i) Resistor
- (ii) Capacitor
- (iii) Inductor

Answer:

1) Application of resistor:

- a) Resistors are used in high frequency instrument.
- b) Resistor is used in power control circuit.
- c) It is used in DC power supplies.
- d) Resistors are used in filter circuit networks.

2) Applications of capacitor:

- a) Use for capacitors is energy storage.
- b) Additional uses include power conditioning, signal coupling or decoupling, electronic noise filtering, and remote sensing.

3) Applications of Inductors:

- a) Filters
- b) Sensors

4) Specifications of Resistor:

- a) Resistivity
- b) Tolerance
- c) Power Rating
- d) Thermal Stability

5) Capacitor specifications:

- a) Capacitance value
- b) Tolerance
- c) Working voltage
- d) Dielectric

6) Inductor Specification:

- a) DC Resistance (DCR)
- b) Maximum DC Current
- c) Electromagnetic Interference (EMI)
- d) Magnetic Saturation Flux Density

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16. Calculate peak-to-peak amplitude, frequency and wavelength of waveforms shown in Fig.1

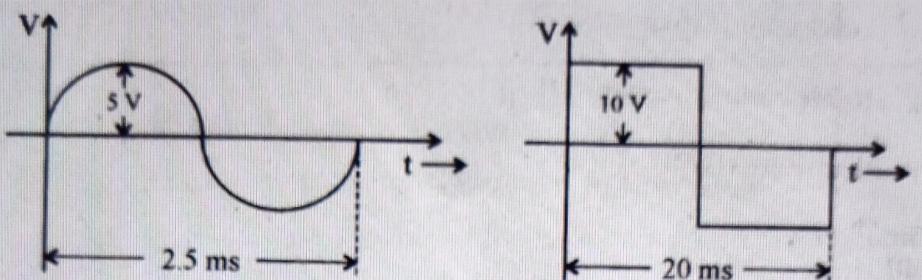


Fig. 1

Answer:**For sine waveform:**

1. Peak to peak amplitude = 10 V
2. Frequency = $1/T = 1/(2.5\text{ms}) = 400 \text{ Hz}$
3. wavelength $\lambda = Vc/f = (3*10^8)/400 = 750000 \text{ m}$

For square waveform:

1. Peak to peak amplitude = 20 V
2. Frequency = $1/T = 1/(20 \text{ ms}) = 50 \text{ Hz}$
3. wavelength $\lambda = Vc/f = (3*10^8)/50 = 6000000 \text{ m}$