

ICH302- ELECTRONIC MEASUREMENTS AND INSTRUMENTS

QUESTION BANK

UNIT-I MEASURING INSTRUMENTS

MCQ QUESTIONS

1. PMMC instruments are mainly used to measure:

- A. AC only
- B. DC only
- C. Both AC and DC
- D. High-frequency signals

Answer: B. DC only

2. The deflecting torque in a PMMC instrument is directly proportional to:

- A. Voltage only
- B. Current only
- C. Resistance
- D. Power

Answer: B. Current only

3. Which material is commonly used for the permanent magnet in a PMMC instrument?

- A. Soft iron
- B. Alnico
- C. Copper
- D. Aluminum

Answer: B. Alnico

4. The deflecting torque equation for a PMMC instrument is:

- A. $T_d \propto V$
- B. $T_d \propto I$
- C. $T_d \propto R$
- D. $T_d \propto P$

Answer: B. **$T_d \propto I$**

5. One major advantage of PMMC instruments is:

- A. Suitable for AC measurements
- B. Uniform scale and high accuracy
- C. Low sensitivity
- D. High power consumption

Answer: B. Uniform scale and high accuracy

6. The scale of a PMMC instrument is:

- A. Non-linear
- B. Logarithmic
- C. Uniform (Linear)
- D. Exponential

Answer: C. Uniform (Linear)

7. Moving Iron (MI) instruments can measure:

- A. DC only
- B. AC only
- C. Both AC and DC
- D. High-frequency signals only

Answer: C. Both AC and DC

8. The deflecting torque of an MI instrument is proportional to:

- A. Current (I)
- B. Voltage (V)
- C. Current squared (I^2)
- D. Resistance (R)

Answer: C. Current squared (I^2)

9. The scale of a Moving Iron instrument is generally:

- A. Uniform
- B. Linear
- C. Non-uniform
- D. Logarithmic

Answer: C. Non-uniform

10. Which type of MI instrument is more commonly used?

- A. Attraction type
- B. Repulsion type
- C. PMMC type
- D. Electrostatic type

Answer: B. Repulsion type

11. The moving element in an MI instrument is made of:

- A. Copper
- B. Aluminum

- C. Soft iron
- D. Steel

Answer: C. Soft iron

12. The operating principle of a Moving Iron instrument is based on:

- A. Electrostatic effect
- B. Heating effect
- C. Magnetic effect of electric current
- D. Chemical effect

Answer: C. Magnetic effect of electric current

13. An MI ammeter is connected:

- A. In parallel with the circuit
- B. In series with the circuit
- C. Across the load only
- D. Across the supply only

Answer: B. In series with the circuit

14. An MI voltmeter is connected:

- A. In series
- B. In parallel
- C. In series and parallel
- D. Across an inductor only

Answer: B. In parallel

15. MI instruments are generally used for measuring:

- A. Current and Voltage
- B. Resistance only
- C. Power factor only
- D. Frequency only

Answer: A. Current and Voltage

16. What is the purpose of a multi-range ammeter?

- A) Measure voltage only
- B) Measure current in different ranges
- C) Measure resistance only
- D) Measure power only

Answer: B) Measure current in different ranges

17. A multi-range ammeter is obtained by using:

- A) Capacitors
- B) Transformers
- C) Different shunt resistors
- D) Inductors

Answer: C) Different shunt resistors

18. What is the primary function of a multi-range voltmeter?

- A) Measure current
- B) Measure resistance
- C) Measure voltage over different ranges
- D) Measure power

Answer: C) Measure voltage over different ranges

19. A multi-range voltmeter is obtained by using:

- A) Shunt resistors
- B) Series multiplier resistors
- C) Capacitors
- D) Inductors

Answer: B) Series multiplier resistors

20. A full-wave rectifier type voltmeter is mainly used to measure:

- A) DC voltage only
- B) AC voltage only
- C) Current only
- D) Resistance only

Answer: B) AC voltage only

21. The function of the full-wave rectifier in the voltmeter is to:

- A) Increase the voltage
- B) Convert AC into pulsating DC
- C) Reduce resistance
- D) Measure current

Answer: B) Convert AC into pulsating DC

22. Choose the correct option

Assertion (A): PMMC instruments have a uniform scale.

Reason (R): The deflecting torque is directly proportional to the current.

- A. Both Assertion (A) and Reason (R) are true, and R is the correct explanation of A
- B. Both A and R are true, but R is not the correct explanation of A.
- C. Assertion (A) is true, but Reason (R) is false.
- D. Assertion (A) is false, but Reason (R) is true.

Answer: A

23. Choose the correct option

Assertion (A): PMMC instruments are widely used in DC ammeters and voltmeters.

Reason (R): Their ranges can be extended using shunts and multiplier resistors.

- A. Both Assertion (A) and Reason (R) are true, and R is the correct explanation of A
- B. Both A and R are true, but R is not the correct explanation of A.

- C. Assertion (A) is true, but Reason (R) is false.
- D. Assertion (A) is false, but Reason (R) is true.

Answer: B

24. Choose the correct option

Assertion (A): MI instruments have a non-uniform scale.

Reason (R): The deflecting torque is proportional to the square of the current.

- A. Both Assertion (A) and Reason (R) are true, and R is the correct explanation of A
- B. Both A and R are true, but R is not the correct explanation of A.
- C. Assertion (A) is true, but Reason (R) is false.
- D. Assertion (A) is false, but Reason (R) is true.

Answer: A

25. Choose the correct option

Assertion (A): MI instruments have a linear scale.

Reason (R): The deflecting torque is proportional to the current.

- A. Both Assertion (A) and Reason (R) are true, and R is the correct explanation of A
- B. Both A and R are true, but R is not the correct explanation of A.
- C. Assertion (A) is true, but Reason (R) is false.
- D. Assertion (A) is false, but Reason (R) is true.

Answer: D

26. Choose the correct option

Assertion (A): MI instruments are widely used in power systems.

Reason (R): They can measure both AC and DC quantities.

- A. Both Assertion (A) and Reason (R) are true, and R is the correct explanation of A
- B. Both A and R are true, but R is not the correct explanation of A.
- C. Assertion (A) is true, but Reason (R) is false.
- D. Assertion (A) is false, but Reason (R) is true.

Answer: B

27. Identify the reason for the uniform scale in a PMMC instrument.

- A) Torque is proportional to current
- B) Torque is proportional to current²
- C) Torque is proportional to voltage²
- D) Torque is inversely proportional to current

Answer: A) Torque is proportional to current

28. Identify the method used to extend the range of a PMMC voltmeter.

- A) Shunt resistor
- B) Capacitor

- C) Multiplier resistor
- D) Current transformer

Answer: C) Multiplier resistor

29. Identify the instrument described below:

- Permanent magnet
- Moving coil
- Linear scale
- Used for precision DC measurements

- A) PMMC Instrument
- B) Moving Iron Instrument
- C) Induction Instrument
- D) Electrostatic Instrument

Answer: A) PMMC Instrument

30. Identify the reason for the non-uniform scale of an MI instrument.

- A) Torque is proportional to current
- B) Torque is proportional to current²
- C) Torque is inversely proportional to current
- D) Torque is proportional to voltage

Answer: B) Torque is proportional to current²

PART-B (Descriptive Questions)

1. Explain the construction and working of PMMC instrument with neat diagram.
2. Explain the attraction type moving iron instrument with necessary diagram.
3. Describe about the range extension of ammeter with example.
4. Explain the repulsion type moving iron instrument with necessary diagram.
5. Analytical type Questions

i) Which of the following statements about a PMMC instrument are correct? (2 marks)

- I. It works on both AC and DC.
- II. It works only on DC.
- III. Deflecting torque is proportional to the current.
- IV. It uses a permanent magnet.

Options:

- A. I and III only
- B. II, III, and IV only
- C. I, II, and IV only
- D. I, II, III, and IV

Answer: B. II, III, and IV only

ii) Which of the following statements are correct? (2 marks)

- I. PMMC instruments have high torque-to-weight ratio.
- II. They are free from hysteresis errors.
- III. They can measure AC directly.
- IV. They have a linear (uniform) scale.

Options:

- A. I, II, and IV only
- B. II and III only
- C. I and III only
- D. All of the above

Answer: A. I, II, and IV only

(iii) Identify the instrument. (2 marks)

Statements:

- I. It has an aluminum pointer attached to a soft iron vane.
- II. It is commonly used as an ammeter and voltmeter.
- III. It is less accurate than a PMMC instrument.
- IV. It is inexpensive and rugged.

Answer: Moving Iron (MI) instrument

(iv) Identify the type of MI instrument. (2 marks)

Statements:

- I. It has a single soft iron piece inside the coil.
- II. The iron piece is attracted into the magnetic field when current flows.
- III. It works on the principle of magnetic attraction.

Answer: Attraction-type Moving Iron instrument

(v) How to distinguish MI from PMMC instrument? (2 marks)

UNIT-II DC AND AC BRIDGES

MCQ QUESTIONS

1. The primary use of a DC bridge is to measure:

- A. Voltage
- B. Current
- C. Resistance
- D. Power

Answer: C. Resistance

2. Which bridge is used to measure medium resistance?

- A. Wheatstone Bridge
- B. Schering Bridge
- C. Maxwell Bridge
- D. Wien Bridge

Answer: A. Wheatstone Bridge

3. Which bridge is used to measure very low resistance?

- A. Wheatstone Bridge
- B. Kelvin Double Bridge
- C. Maxwell Bridge
- D. Anderson Bridge

Answer: B. Kelvin Double Bridge

4. Which of the following is not a DC bridge?

- A. Wheatstone Bridge
- B. Kelvin Double Bridge
- C. Maxwell Bridge
- D. Carey Foster Bridge

Answer: C. Maxwell Bridge

5. DC bridges operate using:

- A. AC supply
- B. DC supply
- C. Pulsating DC only
- D. RF supply

Answer: B. DC supply

6. The balance condition of a Wheatstone bridge is:

- A. $P + Q = R + S$
- B. $P/Q = R/S$
- C. $P \times Q = R \times S$
- D. $P - Q = R - S$

Answer: B. $P/Q = R/S$

7. At bridge balance, the galvanometer current is:

- A. Maximum
- B. Minimum
- C. Zero
- D. Infinite

Answer: C. Zero

8. Which instrument is used as the null detector in a DC bridge?

- A. Ammeter
- B. Voltmeter
- C. Galvanometer
- D. Wattmeter

Answer: C. Galvanometer

9. The Kelvin Double Bridge eliminates the effect of:

- A. Temperature
- B. Stray capacitance
- C. Lead and contact resistance
- D. Frequency

Answer: C. Lead and contact resistance

10. The most accurate method of measuring resistance is:

- A. Ammeter-voltmeter method
- B. Wheatstone bridge method
- C. Ohmmeter method
- D. Clamp meter

Answer: B. Wheatstone bridge method

11. Which DC bridge is specially designed to measure resistances below $1\ \Omega$?

- A. Wheatstone Bridge
- B. Kelvin Double Bridge
- C. Schering Bridge
- D. Hay Bridge

Answer: B. Kelvin Double Bridge

12. Which of the following is an application of the Wheatstone bridge?

- A. Measuring unknown resistance
- B. Measuring power factor
- C. Measuring inductance directly
- D. Measuring frequency

Answer: A. Measuring unknown resistance

13. The ratio arms of a Wheatstone bridge are:

- A. Known resistances
- B. Unknown resistances
- C. Variable inductors
- D. Capacitors

Answer: A. Known resistances

14. The principle of a DC bridge is:

- A. Resonance
- B. Bridge balance (null deflection)
- C. Electromagnetic induction
- D. Electrostatic attraction

Answer: B. Bridge balance (null deflection)

15. AC bridges are mainly used to measure:

- A. Voltage only
- B. Current only
- C. Resistance, Inductance and Capacitance
- D. Power

Answer: C. Resistance, Inductance and Capacitance

16. Which bridge is used to measure unknown inductance?

- A. Wheatstone Bridge
- B. Maxwell Bridge
- C. Kelvin Bridge
- D. Carey Foster Bridge

Answer: B. Maxwell Bridge

17. Which AC bridge is used to measure capacitance and dielectric loss?

- A. Maxwell Bridge
- B. Schering Bridge
- C. Anderson Bridge
- D. Hay Bridge

Answer: B. Schering Bridge

18. Hay Bridge is best suited for measuring:

- A. High-Q inductors
- B. Low-Q inductors
- C. Capacitance
- D. Resistance

Answer: A. High-Q inductors

19. Maxwell Bridge is suitable for measuring:

- A. High-Q coils
- B. Low-Q coils
- C. Capacitance only
- D. Resistance only

Answer: B. Low-Q coils

20. Maxwell Bridge compares an unknown inductance with:

- A. Standard resistor only
- B. Standard capacitor and resistor
- C. Another unknown inductor
- D. Battery

Answer: B. Standard capacitor and resistor

21. Hay Bridge is a modification of:

- A. Wheatstone Bridge
- B. Maxwell Bridge
- C. Kelvin Bridge
- D. Schering Bridge

Answer: B. Maxwell Bridge

22. Choose the correct option

Assertion (A): A DC bridge requires a DC supply for operation.

Reason (R): The Bridge measures resistance using steady current.

- A. Both Assertion (A) and Reason (R) are true, and R is the correct explanation of A
- B. Both A and R are true, but R is not the correct explanation of A.
- C. Assertion (A) is true, but Reason (R) is false.
- D. Assertion (A) is false, but Reason (R) is true.

Answer: A

23. Choose the correct option

Assertion (A): Kelvin double bridge is unsuitable for measuring low resistances.

Reason (R): It eliminates lead resistance errors.

- A. Both Assertion (A) and Reason (R) are true, and R is the correct explanation of A
- B. Both A and R are true, but R is not the correct explanation of A.
- C. Assertion (A) is true, but Reason (R) is false.
- D. Assertion (A) is false, but Reason (R) is true.

Answer: D

24. Choose the correct option

Assertion (A): A Wheatstone bridge gives maximum accuracy near the balance condition.

Reason (R): At balance, the galvanometer current is zero.

- A. Both Assertion (A) and Reason (R) are true, and R is the correct explanation of A
- B. Both A and R are true, but R is not the correct explanation of A.
- C. Assertion (A) is true, but Reason (R) is false.
- D. Assertion (A) is false, but Reason (R) is true.

Answer: A

25. Choose the correct option

Assertion (A): A Wheatstone bridge can directly measure inductance.

Reason (R): It is designed for DC resistance measurement.

- A. Both Assertion (A) and Reason (R) are true, and R is the correct explanation of A
- B. Both A and R are true, but R is not the correct explanation of A.
- C. Assertion (A) is true, but Reason (R) is false.
- D. Assertion (A) is false, but Reason (R) is true.

Answer: D

26. Choose the correct option

Assertion (A): Maxwell Bridge is used to measure an unknown inductance.

Reason (R): It compares the unknown inductance with a standard capacitor.

- A. Both Assertion (A) and Reason (R) are true, and R is the correct explanation of A
- B. Both A and R are true, but R is not the correct explanation of A.
- C. Assertion (A) is true, but Reason (R) is false.

D. Assertion (A) is false, but Reason (R) is true.

Answer: C

27. Choose the correct option

Assertion (A): AC bridges operate only with DC supply.

Reason (R): They measure impedance.

A. Both Assertion (A) and Reason (R) are true, and R is the correct explanation of A

B. Both A and R are true, but R is not the correct explanation of A.

C. Assertion (A) is true, but Reason (R) is false.

D. Assertion (A) is false, but Reason (R) is true.

Answer: D

28. Identify the bridge:

Measures very low resistances.

Eliminates lead and contact resistance errors.

Modified form of Wheatstone bridge.

Commonly used for milliohm measurements.

A. Wheatstone Bridge

B. Maxwells Bridge

C. Kelvin Double bridge

D. Schering Bridge

ANSWER: C) Kelvin Double bridge

29. Identify the bridge:

Measures high-Q inductors.

Uses a standard capacitor.

Suitable for coils with high quality factor.

An AC bridge.

A. Wheatstone Bridge

B. Maxwells Bridge

C. Kelvin Double bridge

D. Hay's Bridge

ANSWER: D) Hay's Bridge

30. Identify the bridge:

Measures unknown resistance.

Consists of four resistive arms.

Used for medium resistance measurement.

Balance condition: $P/Q=R/S$.

- A. Wheatstone Bridge
- B. Maxwells Bridge
- C. Kelvin Double bridge
- D. Hay's Bridge

ANSWER: A) Wheatstone bridge

PART-B (Descriptive Questions)

1. Explain the construction and working of Wheatstone bridge circuit.
2. Explain the measurement of inductance by Maxwell's bridge.
3. Describe the measurement of unknown capacitance by Schering Bridge.
4. Discuss the working of Hays Bridge with neat diagram.
5. Analytical type Questions

(i) Match the following (5 marks)

Bridge Circuit (A)	Quantity Measured (B)	Special Feature (C)
1. Wheatstone bridge	a. Resistance	i. Measures dielectric loss
2. Kelvin double bridge	b. Low resistance	ii. Four resistive arms
3. Maxwell bridge	c. Inductance	iii. Used in oscillator circuits
4. Schering bridge	d. Capacitance	iv. Eliminates lead resistance
5. Wien bridge	e. Frequency	v. Uses a standard capacitor

Correct Answer: a-ii, b-iv, c-v, d-i, e- iii

- (ii) Why is a Kelvin double bridge used instead of a Wheatstone bridge for measuring very low resistance? Explain the importance of eliminating lead resistance. (5 marks)

UNIT-III TEST INSTRUMENTS

MCQ QUESTIONS

1. A DC power supply converts:

- A) DC to AC
- B) AC to DC
- C) AC to AC
- D) DC to DC only

Answer: B) AC to DC

2. The main purpose of a rectifier in a DC power supply is to:

- A) Increase voltage
- B) Reduce current
- C) Convert AC into pulsating DC
- D) Store energy

Answer: C) Convert AC into pulsating DC

3. Which component is used to reduce ripple in a DC power supply?

- A) Transformer
- B) Filter capacitor
- C) Switch
- D) Fuse

Answer: B) Filter capacitor

4. A fixed DC power supply provides:

- A) Adjustable output voltage
- B) Constant output voltage
- C) Variable frequency
- D) AC output voltage

Answer: B) Constant output voltage

5. A variable DC power supply allows the user to:

- A) Change output voltage
- B) Change input frequency only
- C) Remove the transformer

D) Increase AC ripple

Answer: A) Change output voltage

6. Which device is commonly used as a voltage regulator in DC power supplies?

A) Diode

B) Transistor

C) Zener diode

D) Capacitor

Answer: C) Zener diode

7. A linear DC power supply generally uses:

A) Transformer, rectifier, filter, regulator

B) Only a battery

C) Only a diode

D) Only a resistor

Answer: A) Transformer, rectifier, filter, regulator

8. A Megger is used to measure:

A) Current

B) Voltage

C) Insulation resistance

D) Power factor

Answer: C) Insulation resistance

9. A Megger works on the principle of:

A) Electromagnetic induction

B) Mutual induction

C) Electrostatic effect

D) Thermal effect

Answer: A) Electromagnetic induction

10. The main parts of a Megger are:

A) PMMC and rectifier

B) Generator and ratio meter

C) Transformer and capacitor

D) Ammeter and voltmeter

Answer: B) Generator and ratio meter

11. Instrument transformers are mainly used for:

A) Increasing power

B) Measuring high voltage and current safely

C) Reducing frequency

D) Producing DC supply

Answer: B) Measuring high voltage and current safely

12. The two main types of instrument transformers are:

A) CT and PT

B) AC and DC

C) PMMC and MI

D) Moving coil and moving iron

Answer: A) CT and PT

13. A Current Transformer (CT) is used to:

A) Step down high current to low measurable current

B) Step up voltage

C) Measure resistance

D) Measure frequency

Answer: A) Step down high current to low measurable current

14. The secondary current of a standard CT is usually:

A) 100 A

B) 10 A

C) 5 A or 1 A

D) 500 A

Answer: C) 5 A or 1 A

15. A Potential Transformer (PT) is used for measuring:

A) High current

B) High voltage

C) Low resistance

D) Power factor only

Answer: B) High voltage

16. The secondary voltage of a PT is generally:

A) 110 V

B) 440 V

C) 1000 V

D) 5 V

Answer: A) 110 V

17. CT and PT are commonly used in:

A) Protective relays and energy meters

B) Batteries

C) DC motors only

D) Heating equipment

Answer: A) Protective relays and energy meters

18. The main parts of a CRT are:

A) Electron gun, deflection system, fluorescent screen

B) Transformer, rectifier, filter

C) Capacitor, resistor, diode

D) Rotor, stator, commutator

Answer: A) Electron gun, deflection system, fluorescent screen

19. The brightness of the CRT display is controlled by:

A) Anode voltage

B) Grid voltage

C) Deflection voltage

D) Heater voltage

Answer: B) Grid voltage

20. The electron beam in a CRT is deflected by:

A) Electric or magnetic fields

B) Resistors only

C) Capacitors only

D) Transformers

Answer: A) Electric or magnetic fields

21. The time base generator in CRO produces:

A) Sine wave

B) Sawtooth waveform

C) Square wave

D) DC voltage

Answer: B) Sawtooth waveform

22. CRO is classified as a:

A) Indicating instrument

B) Recording instrument only

C) Integrating instrument

D) Mechanical instrument

Answer: A) Indicating instrument

23. Lissajous figures on a CRO are used to measure:

A) Frequency and phase difference

B) Resistance

C) Power factor only

D) Temperature

Answer: A) Frequency and phase difference

24. Choose the correct statements about CRO:

1. CRO is used to display electrical waveforms.

2. CRO can measure voltage, frequency, and phase difference.

3. CRO directly measures resistance.

4. CRT is the main display element of CRO.

A) 1, 2 and 4 only

B) 1 and 3 only

C) 2 and 3 only

D) 1, 2, 3 and 4

Answer: A) 1, 2 and 4 only

25. Choose the correct statements about CRT:

1. Electron gun produces the electron beam.
2. Fluorescent screen converts electron energy into light.
3. Deflection plates control the position of the beam.
4. CRT is used only for measuring current.

- A) 1, 2 and 3 only
B) 2 and 4 only
C) 1 and 4 only
D) All statements are correct

Answer: A) 1, 2 and 3 only

26. Say true or false in the following statement.

Instrument transformers are used only in DC circuits.

- a) True
b) False

Answer b) False

27. Say true or false in the following statement.

A CT has many turns in its primary winding.

- a) True
b) False

Answer b) False

28. Say true or false in the following statement.

PT is used to step down high voltage to a lower measurable voltage.

- a) True
b) False

Answer a) True

29. Choose the correct option

Assertion (A): A fixed DC power supply provides an adjustable output voltage.

Reason (R): A variable DC power supply allows the output voltage to be adjusted.

- A. Both Assertion (A) and Reason (R) are true, and R is the correct explanation of A
B. Both A and R are true, but R is not the correct explanation of A.
C. Assertion (A) is true, but Reason (R) is false.

D. Assertion (A) is false, but Reason (R) is true.

Answer: D

30. Choose the correct option

Assertion (A): The transformer in a DC power supply provides electrical isolation.

Reason (R): The transformer can also step up or step down the AC input voltage.

A. Both Assertion (A) and Reason (R) are true, and R is the correct explanation of A

B. Both A and R are true, but R is not the correct explanation of A.

C. Assertion (A) is true, but Reason (R) is false.

D. Assertion (A) is false, but Reason (R) is true.

Answer: B

PART-B (Descriptive Questions)

1. Explain the working of DC power supply with neat block diagram.
2. Discuss the working and applications of megger in detail.
3. Describe about Instrument transformer in detail.
4. Explain the block diagram of CRO.
5. Analytical Questions
 - i) Describe the role of the fluorescent screen in a CRT. (5 marks)
 - ii) Compare CT and PT with suitable diagrams. (5 marks)

UNIT-IV DIGITAL INSTRUMENTS-1

MCQ QUESTIONS

1. Which instrument displays measurements in numerical form?

A) Analog instrument

B) Digital instrument

C) Electromechanical instrument

D) PMMC instrument

Answer: B) Digital instrument

2. Which instrument generally has higher accuracy?

A) Analog instrument

B) Digital instrument

C) Both have the same accuracy

D) Neither

Answer: B) Digital instrument

3. Analog instruments usually use:

- A) LCD display
- B) LED display
- C) Pointer and scale
- D) Touch screen

Answer: C) Pointer and scale

4. The output of an analog instrument is:

- A) Discrete values
- B) Continuous values
- C) Binary values
- D) Decimal code

Answer: B) Continuous values

5. Which display is commonly used in digital instruments?

- A) Pointer
- B) Mirror scale
- C) LCD or LED
- D) Needle

Answer: C) LCD or LED

6. A Schmitt trigger is mainly used to:

- A) Amplify power
- B) Convert analog signals into clean digital signals
- C) Measure current
- D) Generate AC voltage

Answer: B) Convert analog signals into clean digital signals

7. In an inverting Schmitt trigger, the input signal is applied to the:

- A) Non-inverting (+) terminal
- B) Inverting (−) terminal
- C) Output terminal
- D) Ground terminal

Answer: B) Inverting (−) terminal

8. In a non-inverting Schmitt trigger, the input signal is applied to the:

- A) Inverting (–) terminal
- B) Non-inverting (+) terminal
- C) Output terminal
- D) Supply terminal

Answer: B) Non-inverting (+) terminal

9. A Schmitt trigger can be implemented using:

- A) Operational amplifier
- B) Transformer
- C) Rectifier
- D) Filter only

Answer: A) Operational amplifier

10. Which feedback is essential for a Schmitt trigger?

- A) Positive feedback
- B) Negative feedback
- C) No feedback
- D) Current feedback

Answer: A) Positive feedback

11. A digital frequency meter measures:

- A) RMS value only
- B) Number of cycles per second
- C) Peak voltage only
- D) Power factor

Answer: B) Number of cycles per second

12. The input stage of a digital frequency meter generally includes:

- A) Signal conditioning circuit
- B) Transformer only
- C) Capacitor only
- D) Inductor only

Answer: A) Signal conditioning circuit

13. If 1000 pulses are counted in 1 second, the frequency is:

- A) 100 Hz
- B) 500 Hz
- C) 1000 Hz
- D) 10 Hz

Answer: C) 1000 Hz

14. Which of the following is an advantage of a digital frequency meter?

- A) Parallax error
- B) Low resolution
- C) Mechanical wear
- D) High accuracy

Answer: D) High accuracy

15. In a digital frequency meter, the gate circuit is used to:

- A) Amplify the signal
- B) Control the counting interval
- C) Filter noise
- D) Store data

Answer: B) Control the counting interval

16. Which error is eliminated in a digital frequency meter?

- A) Parallax error
- B) Hysteresis error
- C) Loading error
- D) Drift error

Answer: A) Parallax error

17. What is the primary function of a digital tachometer?

- A. Measure voltage
- B. Measure speed of rotation (RPM)
- C. Measure temperature
- D. Measure pressure

Answer: B. Measure speed of rotation (RPM)

18. Which instrument is used to count pulses in a digital tachometer?

- A. Voltmeter
- B. Frequency counter
- C. Galvanometer
- D. Ammeter

Answer: B. Frequency counter

19. The speed measured by a digital tachometer is usually displayed in:

- A. Volts
- B. Hertz
- C. RPM (Revolutions Per Minute)
- D. Watts

Answer: C. RPM (Revolutions Per Minute)

20. What does DSO stand for?

- A. Digital Storage Oscilloscope
- B. Digital Signal Oscillator
- C. Direct Storage Oscilloscope
- D. Dynamic Signal Oscilloscope

Answer: A. Digital Storage Oscilloscope

21. The input signal of a DSO is digitized by:

- A. DAC
- B. ADC
- C. Multiplexer
- D. Demodulator

Answer: B. ADC

22. Which instrument is most suitable for analysing both analog waveforms and digital logic signals in embedded systems?

- A. Analog CRO
- B. Digital Multimeter
- C. Mixed Signal Oscilloscope (MSO)
- D. Frequency Meter

Answer: C. Mixed Signal Oscilloscope (MSO)

23. Choose the correct answer using the following codes:

Assertion (A): A Mixed Signal Oscilloscope can display analog and digital signals simultaneously.

Reason (R): It combines a Digital Storage Oscilloscope with a logic analyzer.

- A. Both Assertion (A) and Reason (R) are true, and R is the correct explanation of A.
- B. Both A and R are true, but R is not the correct explanation of A.
- C. A is true, but R is false.
- D. A is false, but R is true.

Answer: A

24. Choose the correct answer using the following codes:

Assertion (A): A DSO cannot store waveforms.

Reason (R): A DSO uses internal memory to save waveform data.

- A. Both Assertion (A) and Reason (R) are true, and R is the correct explanation of A.
- B. Both A and R are true, but R is not the correct explanation of A.
- C. A is true, but R is false.
- D. A is false, but R is true.

Answer: D

25. Choose the correct answer using the following codes:

Assertion (A): Mixed Signal Oscilloscopes are widely used in testing digital communication systems.

Reason (R): They can correlate analog waveforms with digital logic transitions.

- A. Both Assertion (A) and Reason (R) are true, and R is the correct explanation of A.
- B. Both A and R are true, but R is not the correct explanation of A.
- C. A is true, but R is false.
- D. A is false, but R is true.

Answer: A

26. Choose the correct statements:

- 1. A digital frequency meter measures the frequency of an input signal.
- 2. It displays the measured frequency in numerical form.
- 3. It requires a stable time base for accurate measurement.
- 4. It measures only DC voltage.

- A. 1, 2 and 3 only
- B. 1 and 4 only
- C. 2 and 4 only
- D. 1, 2, 3 and 4

Answer: A. 1, 2 and 3 only

27. Choose the correct statements about counters in a digital frequency meter:

- 1. Counters count the number of input pulses.
- 2. Counters are digital circuits.
- 3. Counters determine the frequency value.
- 4. Counters generate the reference clock signal.

- A. 1, 2 and 4 only
- B. 1 and 4 only
- C. 1, 2 and 3 only
- D. All are correct

Answer: C. 1, 2 and 3 only

28. Match the following

Column A (Digital Instrument)	Column B (Function)
A. Digital Multimeter	1. Measures frequency of signals
B. Digital Frequency Meter	2. Measures voltage, current and resistance
C. Digital Storage Oscilloscope	3. Measures rotational speed
D. Digital Tachometer	4. Stores and displays waveforms

- A) A-1 B-2 C-3 D-4
- B) A-2 B-3 C-4 D-1
- C) A-2 B-1 C-4 D-3
- D) A-4 B-3 C-2 D-1

ANSWER: C) A-2 B-1 C-4 D-3

29. Match the following

Column A	Column B
A. Digital Storage Oscilloscope (DSO)	1. Logic signal analysis
B. Mixed Signal Oscilloscope (MSO)	2. Waveform storage
C. Logic Analyser	3. Digital circuit testing
D. Digital Frequency Counter	4. Frequency measurement

- A) A-1 B-2 C-3 D-4
- B) A-2 B-1 C-3 D-4
- C) A-2 B-1 C-4 D-3
- D) A-4 B-3 C-2 D-1

ANSWER: B) A-2 B-1 C-3 D-4

30. Choose the wrong statement about a Digital Frequency Meter.

- A. It measures frequency by counting input pulses.
- B. It uses a stable time base.
- C. It measures frequency in Hertz.
- D. It measures frequency by detecting resistance changes.

Answer: D. It measures frequency by detecting resistance changes.

PART-B (Descriptive Questions)

1. Explain the block diagram of digital frequency meter.
2. Explain the working of digital tachometer in detail.
3. Discuss the block diagram and applications of Digital storage oscilloscope.
4. Brief about mixed storage oscilloscope.
5. Analytical questions
 - i) Compare inverting and non-inverting Schmitt triggers. (5 marks)
 - ii) Match the Following (5 marks)

Column A (Device)	Column B (Signal Type)	Column C (Purpose)
A. Digital Storage Oscilloscope	1. Analog + digital signals	a. Embedded debugging
B. Mixed Signal Oscilloscope	2. Analog waveform	b. Signal observation
C. Logic Analyzer	3. Digital logic signals	c. Digital circuit testing
D. Frequency Meter	4. Rotational pulses	d. Speed measurement
E. Tachometer	5. Periodic pulses	e. Frequency measurement

Column A	Column B	Column C
A	2	b
B	1	a
C	3	c
D	5	e
E	4	d

UNIT-IV DIGITAL INSTRUMENTS-II

MCQ QUESTIONS

1. A Digital Voltmeter (DVM) is used to measure:

- A. Current only
- B. Voltage
- C. Frequency only
- D. Resistance only

Answer: B. Voltage

2. The main component used in a Digital Voltmeter is:

- A. Transformer
- B. Oscillator
- C. Analog-to-Digital Converter (ADC)
- D. Motor

Answer: C. Analog-to-Digital Converter (ADC)

3. A Digital Voltmeter displays the measured voltage in:

- A. Analog pointer form
- B. Mechanical scale form
- C. Graphical form only
- D. Numerical form

Answer: D. Numerical form

4. The input signal of a DVM is converted into digital form by:

- A. ADC
- B. DAC
- C. Amplifier
- D. Oscillator

Answer: A. ADC

5. A $3\frac{1}{2}$ digit Digital Voltmeter can display a maximum reading of:

- A. 99
- B. 999
- C. 1999
- D. 9999

Answer: C. 1999

6. Which of the following is a type of Digital Voltmeter?

- A. Ramp type DVM
- B. Integrating type DVM
- C. Successive approximation type DVM
- D. All of the above

Answer: D. All of the above

7. A dual-slope integrating DVM converts input voltage into:

- A. Current
- B. Time interval
- C. Resistance
- D. Frequency

Answer: B. Time interval

8. The major advantage of an integrating type DVM is:

- A. Good rejection of power line noise
- B. Very low accuracy
- C. No requirement of ADC
- D. High mechanical movement

Answer: A. Good rejection of power line noise

9. A successive approximation type DVM uses:

- A. SAR ADC
- B. DAC and comparator
- C. Both A and B
- D. Transformer only

Answer: C. Both A and B

10. The conversion speed of a successive approximation DVM is:

- A. Faster than integrating DVM
- B. Slower than analog meter
- C. Always zero
- D. Independent of ADC

Answer: A. Faster than integrating DVM

11. Which type of DVM provides the highest accuracy?

- A. Ramp type
- B. Integrating type
- C. Digital multimeter type
- D. Analog voltmeter

Answer: B. Integrating type

12. The digital ramp type DVM uses:

- A. DAC and counter
- B. Motor and pointer
- C. Thermistor
- D. Frequency divider only

Answer: A. DAC and counter

13. Which type of DVM is commonly used in digital multimeters?

- A. Dual-slope integrating type
- B. Mechanical type
- C. Moving iron type
- D. Induction type

Answer: A. Dual-slope integrating type

14. Which DVM has better speed but lower noise rejection?

- A. Successive approximation type
- B. Dual-slope type
- C. Integrating type
- D. Voltage-to-frequency type

Answer: A. Successive approximation type

15. The basic principle of a digital voltmeter is:

- A. Comparing unknown voltage with a reference frequency
- B. Measuring current only
- C. Measuring magnetic field
- D. Comparing unknown voltage with a reference voltage

Answer: D. comparing unknown voltage with a reference voltage

16. The main disadvantage of a ramp type DVM is:

- A. High cost
- B. Poor accuracy due to noise and clock errors
- C. Very low speed always
- D. No digital output

Answer: B. Poor accuracy due to noise and clock errors

17. A Digital Multimeter is used to measure:

- A. Voltage only
- B. Current only
- C. Resistance only
- D. Voltage, current and resistance

Answer: D. Voltage, current and resistance

18. The input impedance of a Digital Multimeter is generally:

- A. Very high
- B. Very low
- C. Zero
- D. Infinite current

Answer: A. Very high

19. The advantage of a Digital Multimeter over an analog multimeter is:

- A. Higher loading effect
- B. Better accuracy and readability
- C. Mechanical operation
- D. Lower resolution

Answer: B. Better accuracy and readability

20. A DMM can measure AC voltage by using:

- A. Rectifier and ADC
- B. Transformer only
- C. Oscillator only
- D. Counter only

Answer: A. Rectifier and ADC

21. The current measurement in a DMM is performed by connecting:

- A. A high resistance in parallel
- B. A low resistance shunt in series
- C. A capacitor in series
- D. An inductor in parallel

Answer: B. A low resistance shunt in series

22. A DMM measures resistance using:

- A. Internal battery source
- B. External generator only
- C. Transformer
- D. Oscillator

Answer: A. Internal battery source

23. Digital Multimeters are widely used in:

- A. Electrical and electronic testing
- B. Mechanical balancing only
- C. Chemical analysis only
- D. Optical measurement only

Answer: A. Electrical and electronic testing

24. Choose the correct statements about a Digital Multimeter.

1. A DMM can measure voltage, current, and resistance.
2. A DMM uses an Analog-to-Digital Converter.
3. A DMM displays readings in numerical form.
4. A DMM always uses a moving coil pointer.

- A. 1, 2 and 4 only
- B. 1 and 4 only
- C. 2 and 4 only
- D. 1, 2 and 3 only

Answer: D. 1, 2 and 3 only

25. Choose the correct statements about ADC in a DMM.

- 1. ADC converts analog signals into digital data.
- 2. ADC improves digital measurement capability.
- 3. ADC converts digital signals into analog signals in a DMM.
- 4. ADC affects the accuracy of the instrument.

- A. 1, 2 and 4 only
- B. 1 and 3 only
- C. 2 and 3 only
- D. All are correct

Answer: A. 1, 2 and 4 only

26. Choose the correct statements about DMM measurement functions.

- 1. Voltage measurement is a common function of DMM.
- 2. Current measurement is possible using a DMM.
- 3. Resistance measurement requires an internal source.
- 4. DMM can measure only AC signals.

- A. 1, 2 and 4 only
- B. 1, 2 and 3 only
- C. 2 and 4 only
- D. All are correct

Answer: B. 1, 2 and 3 only

27. Choose the correct statements about auto-ranging DMMs.

- 1. Auto-ranging selects the suitable measurement range automatically.
- 2. It reduces manual range selection.
- 3. It reduces user convenience.
- 4. It eliminates all measurement errors.

- A. 1, 2 and 3 only
- B. 1 and 3 only
- C. 1 and 2 only
- D. All are correct

Answer: C. 1 and 2 only

28. Choose the correct statements about DMM display.

- 1. LCD displays are commonly used in DMMs.
- 2. Digital display reduces reading errors.
- 3. Display resolution affects measurement capability.
- 4. DMMs always use CRT displays.

- A. 1, 2 and 3 only
- B. 1 and 4 only
- C. 2 and 4 only
- D. All are correct

Answer: A. 1, 2 and 3 only

29. Assertion (A): The ADC is an important part of a Digital Voltmeter.

Reason (R): ADC converts digital signals into analog signals.

- A. Both Assertion (A) and Reason (R) are true, and R is the correct explanation of A.
- B. Both A and R are true, but R is not the correct explanation of A.
- C. A is true, but R is false.
- D. A is false, but R is true.

ANSWER: C

30. Assertion (A): A successive approximation type DVM has faster conversion speed.

Reason (R): It uses a successive approximation register and DAC for comparison.

- A. Both Assertion (A) and Reason (R) are true, and R is the correct explanation of A.
- B. Both A and R are true, but R is not the correct explanation of A.
- C. A is true, but R is false.
- D. A is false, but R is true.

ANSWER: A

PART-B (Descriptive Questions)

1. Explain any one type of digital voltmeter in detail.
2. Explain Successive approximation type DVM in detail.
3. Explain the block diagram and applications of function generator in detail.
4. Describe the function of Digital Multimeter in detail.
5. Analytical Questions.
 - i) Define auto ranging, auto zeroing and auto polarity (5 marks)
 - ii) Compare Linear and Digital ramp type DVM. (5 marks)