INSTRUMENTATION

UNIT – III

BY

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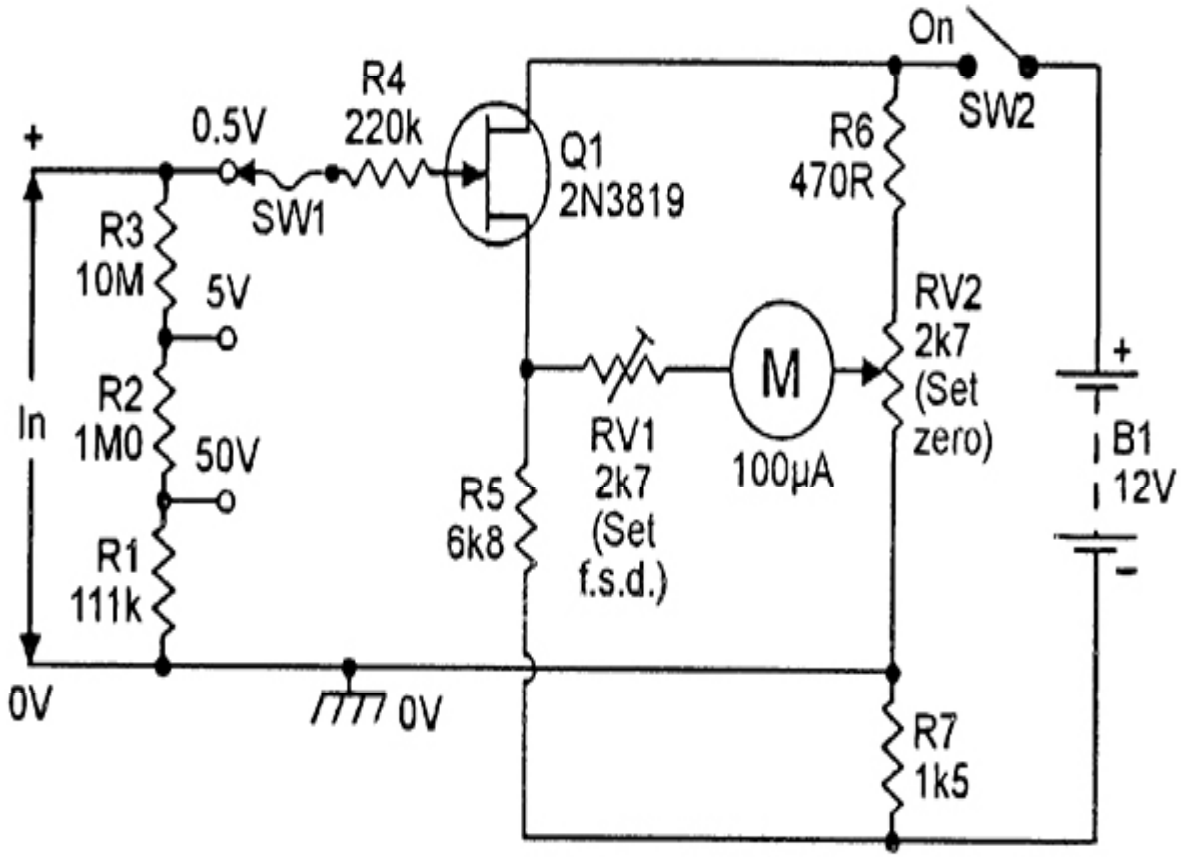
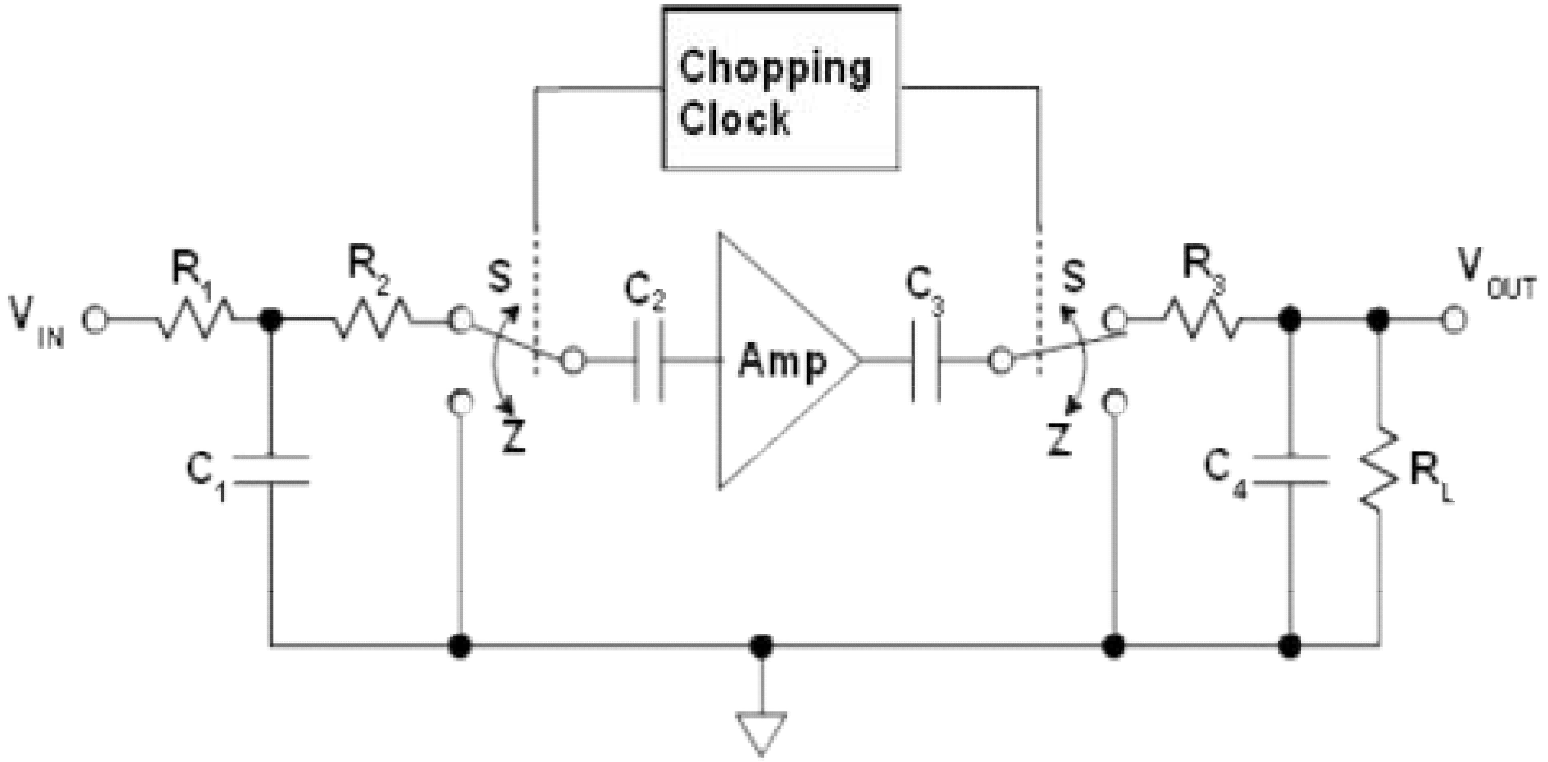
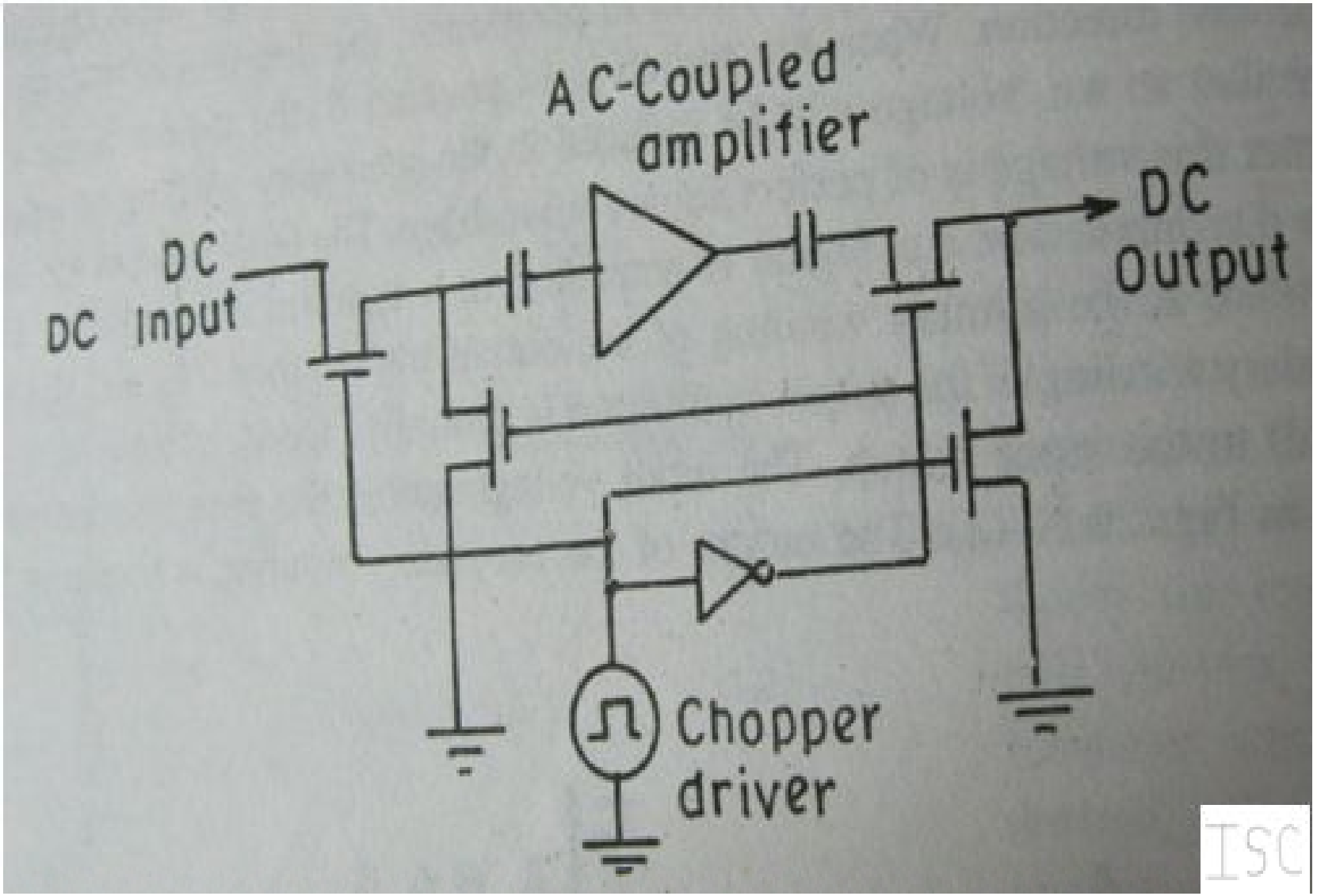
Amplified DC Meter



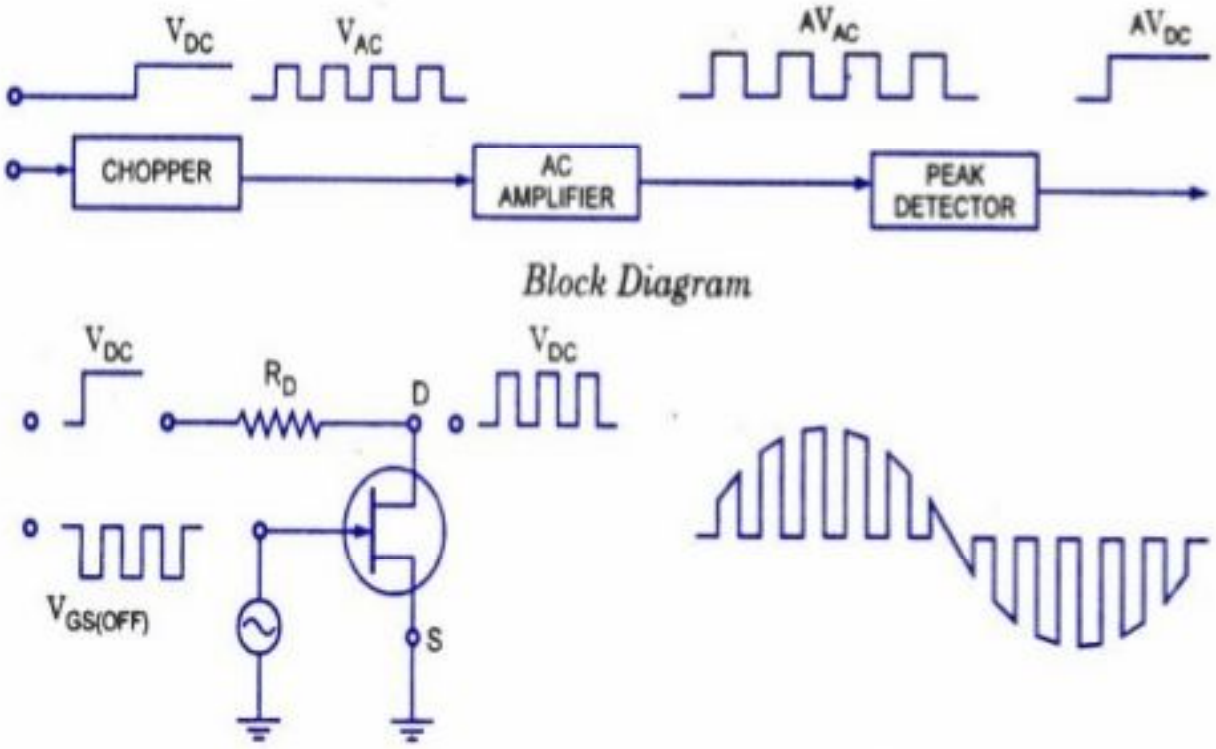
- A FET is used for the **purpose of directly coupling amplification** of input signal.
- A bipolar transistor makes a balanced bridge circuit by the use of several resistors with it.
- **FET** is to serve as a source follower and it transforms the impedance between input section and base terminal of the transistor used.

CHOPPER STABILIZED AMPLIFIER




AC-Coupled
amplifier
DC
DC Input
DC
Output
Chopper
driver

Chopper Stabilized amplifiers



- **The advantages of direct coupled amplified DC voltmeter**

- The power drawn from the circuit is less, when input impedance is increased by using amplifier of unity gain.

- Emitter follower is driven by the source follower.

- The combination is capable of many fold of increase in impedance while the voltage gain is kept unity.

- Input impedance of the circuit is about 10 mega ohm, for which power in range 0.0025 micro watt is needed for a 0.5 volt deflection

- On the other hand this required power may be in range of 25 micro watt in case of an unamplified circuit. This increases the sensitivity of the system.

Advantages	Disadvantages
✓ Simplicity of design	✓ Low efficiency if input-output difference is large
✓ Lower parts count	✓ Low efficiency = significant heat dissipation
✓ Space savings (unless a heat sink is used)	✓ May require a heat sink
✓ Low noise	✓ Capable exclusively of step-down operations
✓ Fast transient response	
✓ Low cost	

Applications

- AV devices
- RF, radio, communication devices
- Medical equipment
- Measurement devices
- Small-power supply units

AC Voltmeter using Rectifiers

Rectifier type instruments generally use a PMMC movement along with a rectifier arrangement.

Silicon diodes are preferred because of their low reverse current and high forward current ratings.

Figure gives an ac voltmeter circuit consisting of a multiplier, a bridge rectifier and a PMMC movement.

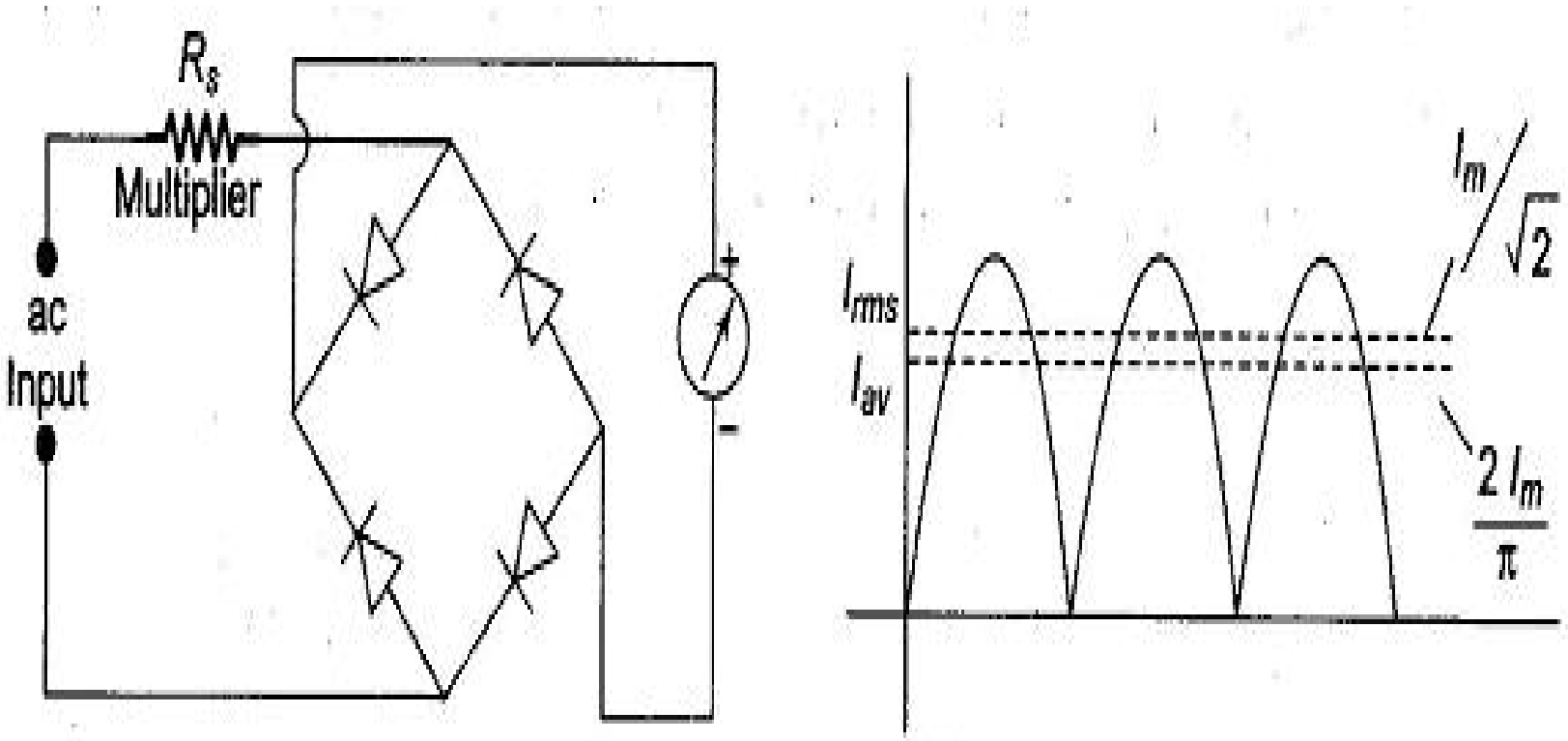


Fig. 4.16 (a) ac Voltmeter (b) Average and RMS Value of Current

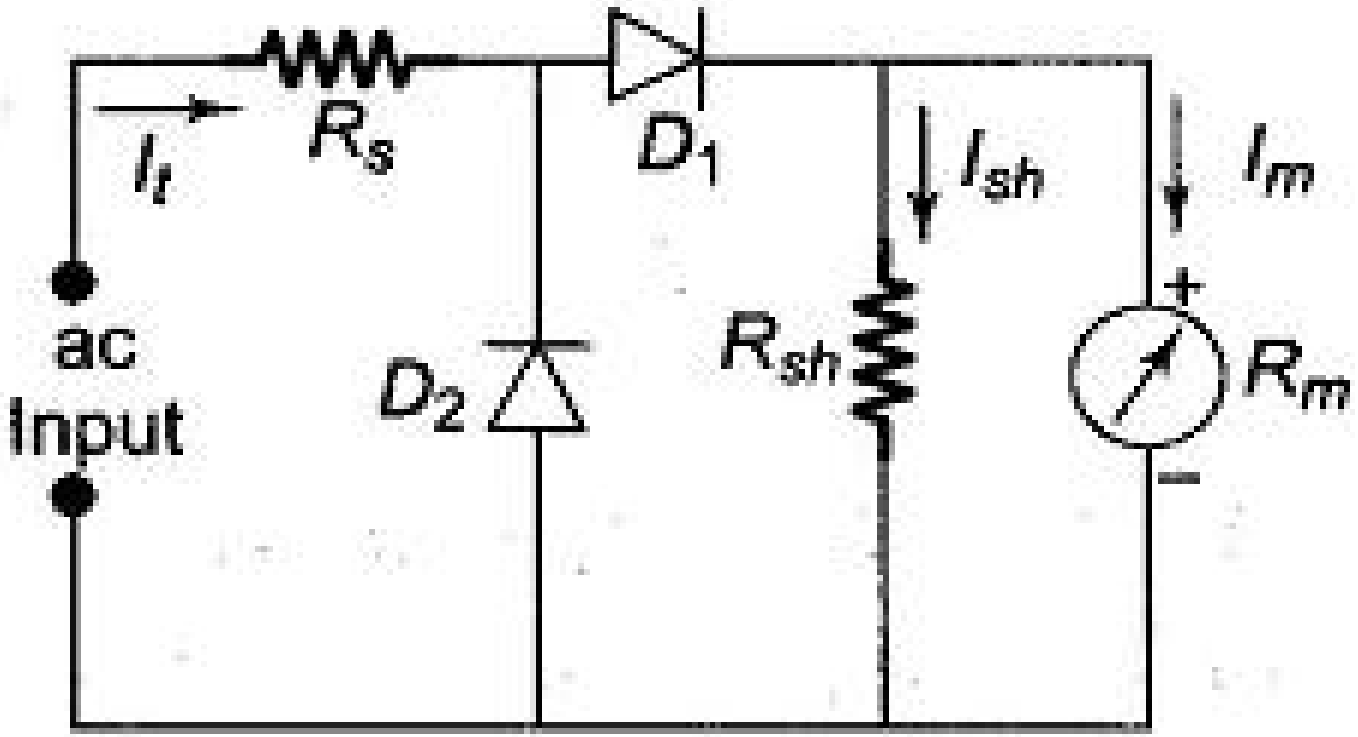
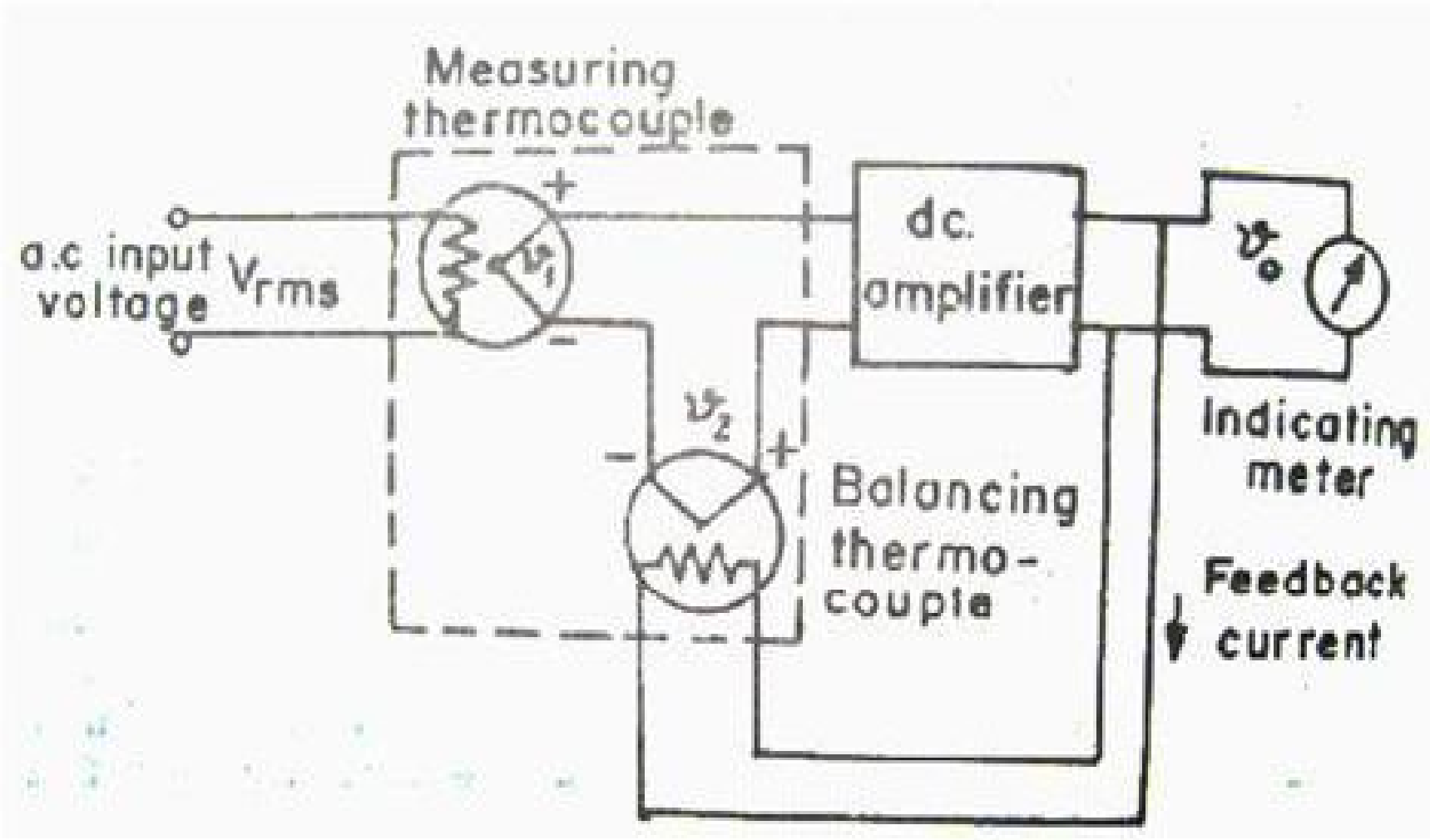


Fig. 4.17 General Rectifier Type ac Voltmeter

True RMS responding voltmeter




DCV
DCA
TES
GM-270

- A Multimeter is an electronic instrument, every electronic technician and engineers widely used piece of test equipment.
- Multimeter is mainly used to measure the three basic electrical characteristics of voltage, current and resistance.
- It can also be used to test continuity between two points in a electrical circuit.
- Multimeter has multi functionalities like, it acts like ammeter, voltmeter and ohmmeter.
- It is a handheld device with positive and negative indicator needle over a numeric LCD digital display. Multimeters can be used for testing batteries, household wiring, electric motors and power supplies.

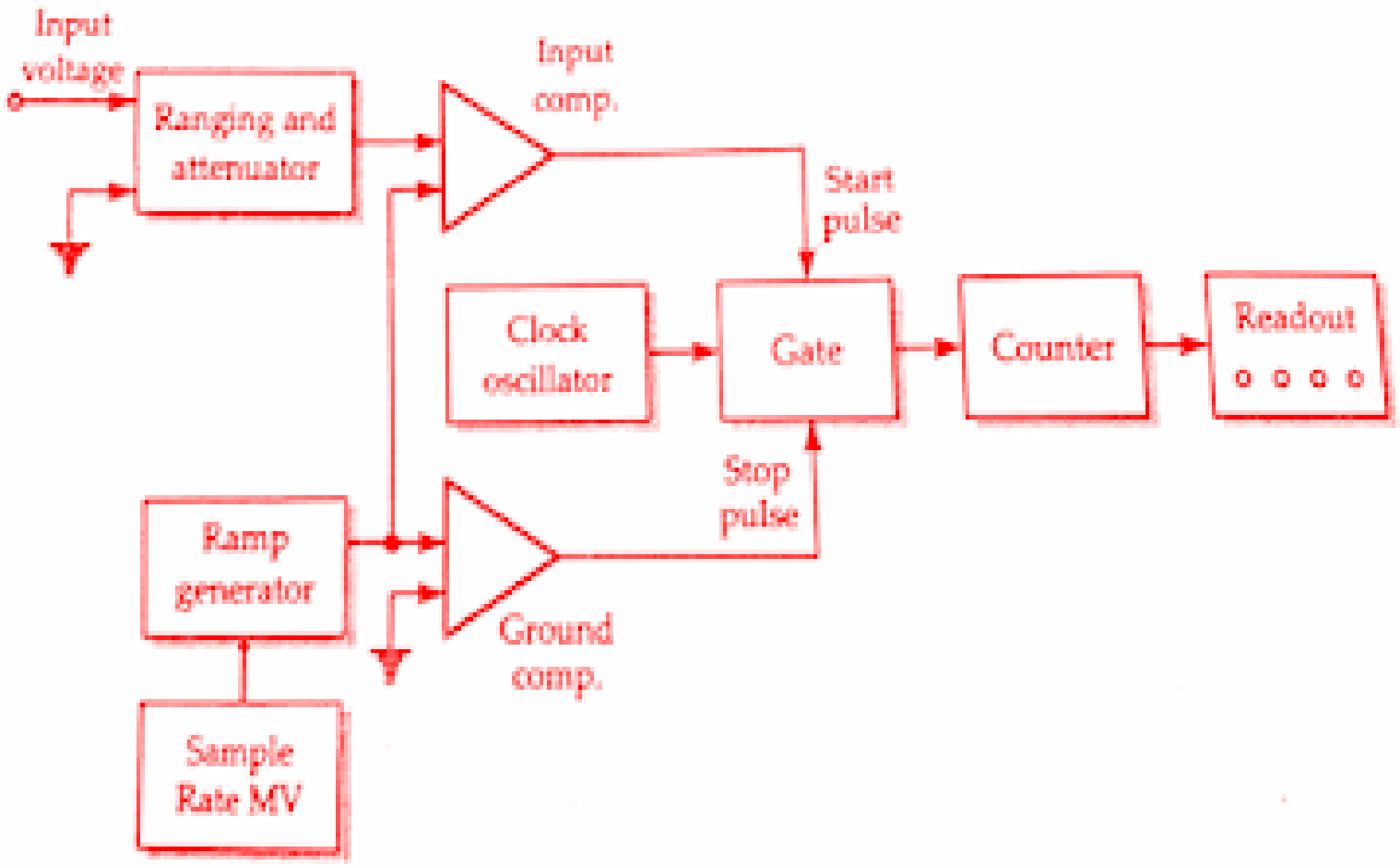
- **Applications:**
- The applications of ammeter mainly involves in various electrical and electronic projects for the purpose of components testing and also used in different measurement applications in multimeter.
- Temperature and Environmental Applications
  - Low cost weather station
  - DMM internal temperature
- Voltage Measurements
  - High and low value DC measurement
  - Peak to Peak and DC average measurement
- Current Measurements
  - DC current measurement
  - True RMS AC current
- Resistance Measurement
  - Micro ohm meter
  - Measuring resistance with constant voltage
  - Measuring resistance with constant current
- Time and Frequency measurement
  - Fast frequency
  - Time measurement

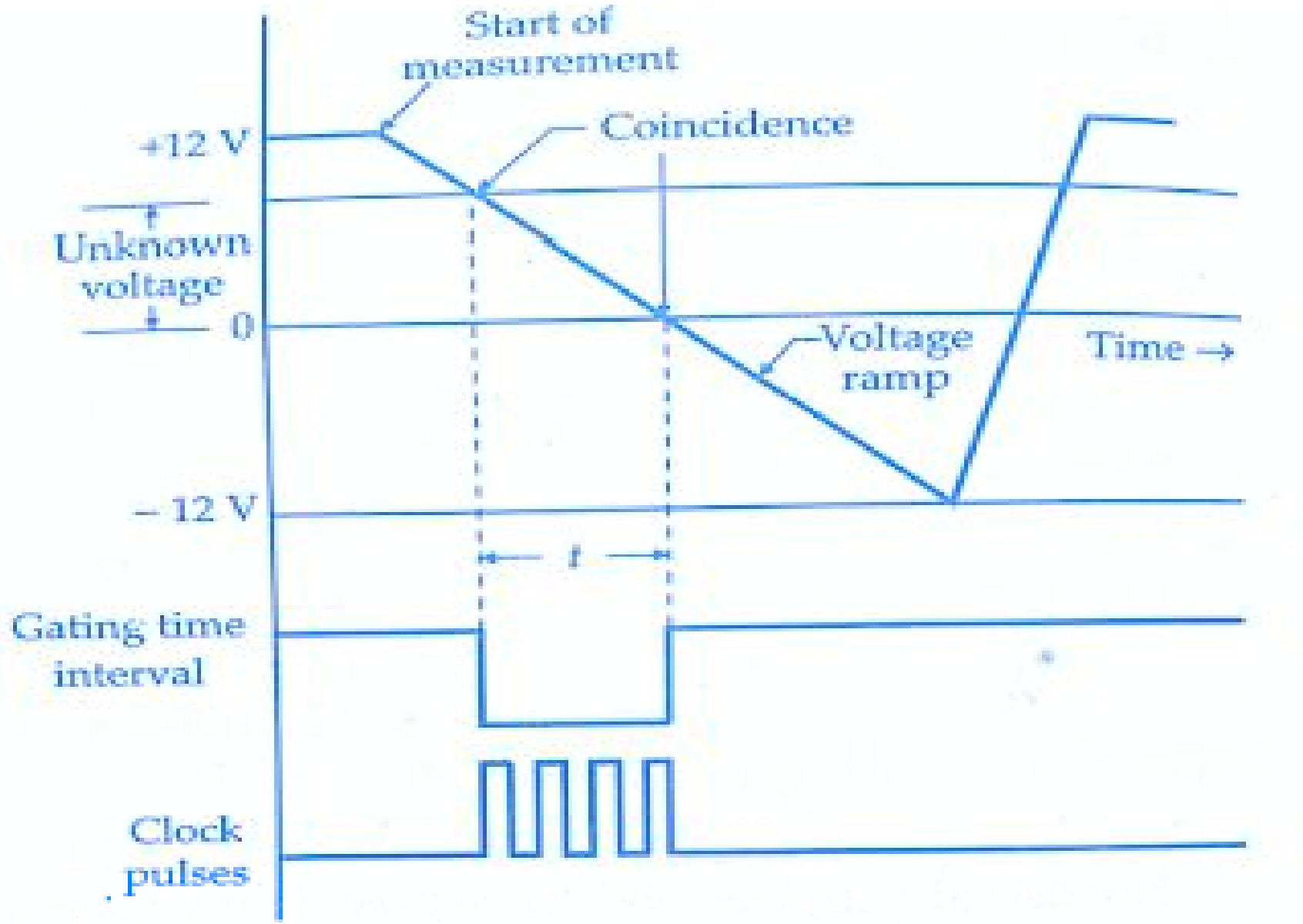
Digital Voltmeters

- **Advantages Associated with Digital Voltmeters**
- Read out of **DVMs** is easy as it eliminates observational errors in measurement committed by operators.
- Error on account of parallax and approximation is entirely eliminated.
- Reading can be taken very fast.
- Output can be fed to memory devices for storage and future computations.
- Versatile and accurate
- Compact and cheap
- Low power requirements
- Portability increased

- On the basis of A/D conversion method used digital voltmeters can be classified as:
- Ramp type digital voltmeter
- Integrating type voltmeter
- Potentiometric type digital voltmeters
- Successive approximation type digital voltmeter
- Continuous balance type digital voltmeter

Ramp Type Digital Voltmeter(DVM)




Start of measurement
Coincidence
+12 V
Unknown voltage
0
Voltage ramp
Time →
– 12 V
t
Gating time interval
Clock pulses

THANK YOU