

UNIT-1

1. Define ohm's Law

At constant Temperature, the current flowing through the circuit is directly proportional to its applied voltage & inversely proportional to its resistance

$$V \propto IR$$

$$I = \frac{V}{R}$$

where

$I \rightarrow$ current in ampere

$V \rightarrow$ Voltage in volts

$R \rightarrow$ Resistance in ohms.

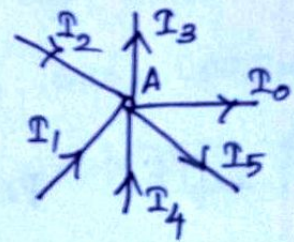
2. Define Kirchoff's current Law.

The sum of the current entering the node is equal to the sum of the current leaving the node.

$$I_1 + I_2 + I_4 = I_3 + I_5 + I_6$$

$$I_1 + I_2 - I_4 - I_3 - I_5 - I_6 = 0.$$

$$\sum I \text{ at Junction Point} = 0$$



3. Define kirchoff's Voltage Law.

Kirchoff's voltage Law (KVL) states that the algebraic sum of the voltages around any closed path is zero.

$$\text{Around a closed path } \sum V = 0$$

4. Define R.M.S Value.

The r.m.s value may be determined by taking the mean of the squares of the instantaneous value of current over one complete cycle.

$$\text{RMS} = \sqrt{\frac{(\text{Area under hatched line})^2}{\text{Period}}}$$

5. What is average value?

* It is defined as area under one complete cycle to period.

* The average value of the sinewave is the total area under the half-cycle curve divided by the distance of the curve.

$$\text{Average value} = \frac{\text{Area under one complete cycle}}{\text{Period}}$$

6. Define Peak factor

Peak factor is defined as the ratio of the maximum value to the rms value.

$$\text{Peak Factor (Kp)} = \frac{\text{Maximum Value}}{\text{RMS Value}}$$

7. Define form factor

The ratio of RMS value to the average value is called the form factor.

$$\text{Form factor } (k_f) = \frac{\text{RMS Value}}{\text{Average value.}}$$

8. What is instantaneous value?

The value of an alternating current, at any particular moment is called its instantaneous value.

9. Define effective value or RMS value of a sinusoidal voltage.

The RMS value may be determined by taking the mean of the squares of the instantaneous value of current over one complete cycle. This is often known as the effective value.

$$V_{\text{rms}} = \sqrt{\frac{1}{T} \int_0^T [v(t)]^2 dt}$$

10. What are independent sources?

Independent sources are those in which, voltage and current are independent and are not affected by other part of the circuit.

11. What are dependent sources?

Dependent sources are those in which source voltage or current is not fixed, but is dependent on the voltage or current existing at some other location in the circuit.

12. What are the different types of dependent or controlled sources?

1. Voltage controlled voltage sources (VCVS)
2. Current controlled voltage sources (CCVS)
3. Voltage controlled current sources (VCCS)
4. Current controlled current sources (CCCS)

13. What is apparent power?

The product of V_{rms} and I_{rms} is known as the apparent power (S). Apparent power (S) = $V_{eff} I_{eff}$ VA

14. Define power factor?

The ratio of the average power to the apparent power is called the power factor.

$$\text{Power Factor} = \frac{\text{Average power}}{\text{Apparent power}}$$

15. Write the expression for finding reactive power

Reactive power is given by

$$Q = V_{eff} I_{eff} \sin \theta \text{ VAR}$$

UNIT-II

1. What is the basic principle of dc generator.

* Basic principle of dc generator is Faraday's Law of electromagnetic induction.

* whenever a conductor is moved in a magnetic field, dynamically induced emf is produced in that conductor.

2. What are the basic parts of a dc generator.

1. Magnetic Frame or yoke.

2. Poles

3. Armature

4. Commutator, Pole shoes, Armature windings, Interpoles

5. Brushes, bearings & shaft.

3. Write down the emf equation of a d.c generator.

$$E_g = \frac{P\phi ZN}{60A} \text{ volts}$$

E_g → Induced emf in generator

P → Number of poles

Z → Total number of conductors in armature.

N → Speed in rpm

A → Number of parallel paths

ϕ → flux per pole in wb.

4. What are the different types of d.c generators?

1. Separately excited d.c generator
2. Self excited d.c generator
 - a) Series generator
 - b) Shunt generator
 - c) Compound generator.
 - Long shunt compound
 - Short shunt compound.

5. What is the basic principle of operation of a d.c motor.

* A current carrying conductor placed in a magnetic field experiences a force tending to move it. * The direction of force is given by Fleming's left hand rule.

6. Define back emf or counter emf.

* If the armature of a D.C motor rotates under the influence of the driving torque, the armature conductor moves through the magnetic field and hence emf is induced in the generator.

* The induced emf acts in opposite direction to the applied voltage V and is known as back emf (or) counter emf.

$$E_b = \frac{P\phi Nz}{60 A} \text{ Volts.}$$

7. What are the major characteristics of D.C Motor.

1. Torque Vs Armature current
2. speed vs Armature current
3. speed vs Torque characteristics.

8. Define shaft Torque.

The Torque which is available at the motor shaft for doing useful work is known as shaft torque.

$$T_{sh} = 9.55 \times \frac{\text{output}}{\text{speed of the motor}} \text{ Nm.}$$

9. Mention few speed control of D.C shunt Motor?

1. Armature control Method.
2. Field control Method.
3. Voltage control Method.

10. Mention few speed control Methods of DC series Motor?

1. Flux control Method.
2. Variable resistance in series with Motor.

11. Write down the voltage equation of a d.c Motor.

$$V = E_b + I_a R_a.$$

$V \rightarrow$ applied voltage.

$I_a \rightarrow$ armature current

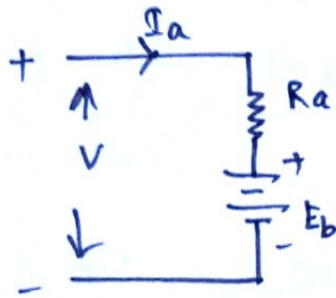
$E_b \rightarrow$ back emf

$R_a \rightarrow$ armature Resistance.

12. What are the purpose of using brushes in D.C generator ?

1. To collect current from commutator to external Load circuit
2. To provide Lubrication.

13. Draw the circuit Model of DC Motor .



$V \rightarrow$ supply voltage .

$I_a \rightarrow$ armature current

$R_a \rightarrow$ armature resistance

$E_b \rightarrow$ back emf .

14. What is a dc shunt motor?

* In a dc shunt motor, the field winding is connected across the armature.

* the shunt field winding has more number of turns and less cross sectional area.

15. What is a separately excited d.c motor?

* In this motor, field winding and armature windings are separated.

* The field winding is excited by a separate D.C source .

* That is why it is called separately excited D.C Motor .

UNIT - III

1. Define forbidden energy gap.

Gap between the upper most band "conduction band" and the lower one "valance band", is known as forbidden energy gap.

2. Distinguish between intrinsic semiconductor and extrinsic semiconductor.

Intrinsic semiconductor	Extrinsic semiconductor
1. It is pure form of semiconductor.	1. An impurity or doping agent added to the pure semiconductor.
2. Number of electrons and holes are equal	2. number of electrons and holes are not equal
3. conductivity is poor	3. conductivity is improved.

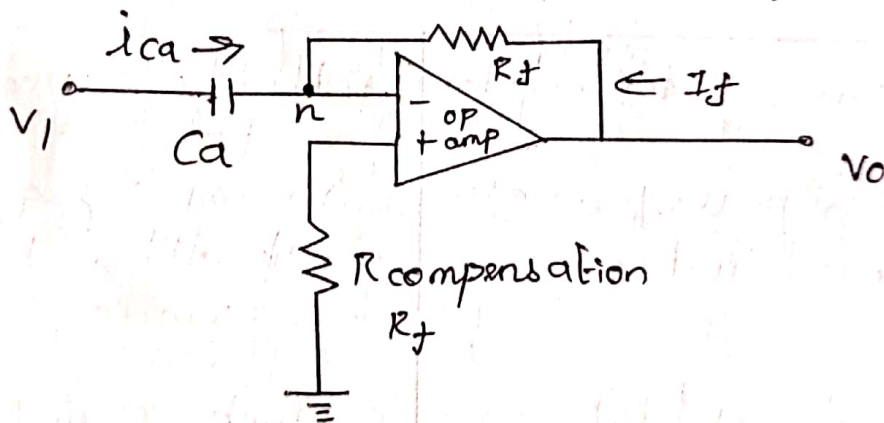
3. What is fermi level?

At room temperature the maximum energy level occupied by an electron is at the middle of the forbidden energy gap, it is known as fermi level.

4. What do you mean by depletion layer in PN junction diode? (April/May-2018)

The immobile positive ions deposited across the P region into N region, similarly, the immobile negative ions deposited across the N region into P region is restricted. These immobile ions form a depletion region.

5. Draw the circuit arrangement of op-amp based differentiator. (April-May-2018)



6. What are the applications of 555 timer IC?

1. Oscillator
2. Traffic light control
3. Ramp and square wave generator
4. Frequency divider
5. Burglar alarm
6. Pulse generator
7. Voltage monitor.

7. what is an operational amplifier ?

Operational amplifier is a basic analog device used for constructing merely mathematical circuit. The mathematical operations are addition, differentiation, integration etc.

8. Define transistor biasing ?

The proper flow of zero signal DC collector current and the maintenance of proper collector emitter voltage during the passage of signal is known as transistor biasing.

9. Why transistor is called current controlled device ?

Transistor is also called current controlled device, because, the collector current can be controlled by base current.

10. What is meant by zener effect ?

In a general purpose p-n diode, the doping is light. As a result of this, the breakdown voltage is high. This effect is known as zener effect.

11. What is an extrinsic semiconductor?
Impure form of semiconductor is called as Extrinsic semiconductor.
Example: N and P type semiconductor.

12. What do you mean by ripple factor?
The ripple factor is defined as the ratio of the effective value or rms value of the ac component of voltage or current to the average value of voltage or current.

13. Enlist the limitations of bipolar junction transistor.

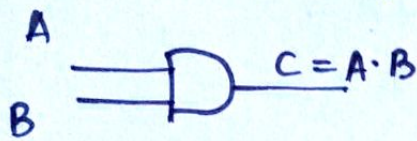
1. It has low input impedance because of forward biased emitter junction.
2. There is considerable noise is present in the transistor.

UNIT - IV

1. What are the types of Number system used?

1. Decimal Number system
2. Binary Number system
3. Hexadecimal Number system
4. Octal Number system.

2. Draw the logic symbol for AND gate & Truth table.



A	B	C
0	0	0
0	1	0
1	0	0
1	1	1

3. Write down AND Laws.

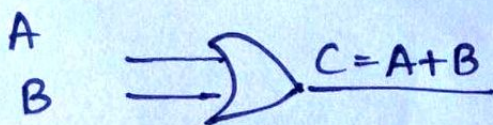
$$A \cdot 1 = A$$

$$A \cdot 0 = 0$$

$$A \cdot A = A$$

$$A \cdot \bar{A} = 0$$

4. Draw the logic symbol for 'OR' gate and its Truth Table.



A	B	C
0	0	0
0	1	1
1	0	1
1	1	1

5. Write down the 'OR' Laws.

$$A+0 = A$$

$$A+1 = 1$$

$$A+A = A$$

$$A+\bar{A} = 1$$

6. Write down NOT Laws.

$$\ast A=0 \text{ then } \bar{A}=1$$

$$\ast A=1 \text{ then } \bar{A}=0$$

7. Convert the binary fraction 101 into decimal equivalent

$$\begin{aligned}(101)_2 &= 1 \times 2^0 + 0 \times 2^1 + 1 \times 2^2 \\ &= 1 + 0 + 4 \\ &= 5\end{aligned}$$

8. Convert $(0707)_{10}$ to binary

$$\begin{array}{r} 2 \overline{) 0707} \\ \underline{2 353} 1 \\ 2 \overline{) 176} 1 \\ \underline{2 88} 0 \\ 2 \overline{) 44} 0 \\ \underline{2 22} 0 \\ 2 \overline{) 11} 0 \\ \underline{2 5} 1 \\ 2 \overline{) 2} 1 \\ \underline{1} 0 \end{array}$$

$$707_{10} = 1011000011_2$$

9. Prove that $A + \bar{A}B = A + B$

$$\begin{aligned} A + \bar{A}B &= A \cdot 1 + \bar{A}B \\ &= A(1+B) + \bar{A}B \\ &= A \cdot 1 + AB + \bar{A}B \\ &= A + AB + \bar{A}B \\ &= A + BA + B\bar{A} \\ &= A + B(A + \bar{A}) \\ &= A + B. \end{aligned}$$

10. State De Morgan's Law.

$$* \bar{A} \cdot \bar{B} = \overline{A+B}$$

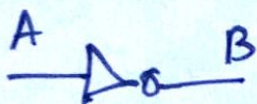
$$* \overline{A+B} = \bar{A} \cdot \bar{B}$$

11. Draw the Truth table and Logic diagram for half adder.



A	B	sum	carry
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

12. Draw the logic symbol and Truth table for NOT gate



A	B
0	1
1	0

13. Define product Term.

The AND function is referred to as Product Term.

14. Define Sum Term.

An OR function is generally used to refer a sum Term.

15. What are Logical function can be expressed.

1. Sum of products (sop)

2. ~~Sum of~~

2. Product of sums (pos)

UNIT - V

1. What are the functional elements of an instrument?

1. Primary sensing element
2. Variable conversion element
3. Variable Manipulation element
4. Data Transmission element
5. Data Presentation element.

2. What are the major parts of energy meter?

1. Driving system
2. Moving system
3. Braking system
4. Registering system.

3. Compare moving coil instrument & moving iron instrument.

Moving coil

Moving Iron.

* More accurate

Less accurate.

* Uniform scale

Non-Uniform scale.

* Eddy current damping is used

Air friction damping is used.

* Can be used only for D.C. Measurements.

can be used for A.C. as well as for D.C. Measurements.

4. What is the principle of PMMC instrument?

The amount of force experienced by the coil is proportional to the current passing through the coil.

5. Define standards in Measurement.

* A standard of measurement is a physical representation of a unit of measurement.

* A standard means known accurate measure of physical quantity.

6. Types of standards.

1. International standards
2. Primary standards
3. Secondary standards
4. Working standards.

7. Define calibration.

The calibration is the procedure for determining the correct values of measurand by comparison with the standard ones.

8. What are the types of moving coil instruments.

Two types.

⇒ Permanent magnet moving coil type (PMMC)

⇒ Dynamometer type.

9. What are the methods used to carry the three phase power measurement.

* One wattmeter method

* Two wattmeter method

* Three wattmeter method.

10. What is Instrument Transformers.

Specially constructed ratio transformers are used in conjunction with measuring instruments called Instrument Transformers.

11. Classify Instrument transformers.

(i) current transformer (C.T) \Rightarrow used for current measurement.

(ii) potential transformer (P.T) \Rightarrow used for voltage measurement.

12. Define DSO.

DSO - Digital storage oscilloscope.

* DSO is an instrument which gives the storage of a digital waveform or the digital copy of the waveform or it allows us to do the digital signal processing techniques over that signal.

13. Define Data acquisition.

The system used for data processing, data conversion, data transmission, data storage is called data acquisition system.

14. Classify Moving Iron Instruments.

(i) Moving Iron attraction type.

(ii) Moving Iron Repulsion type.

15. State the principle of Energy Meter.

On production of eddy currents in the moving system by the alternating fluxes. These eddy currents induced in the moving system interact to produce a driving torque due to which disc rotates to record the energy