



SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

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Department of Electrical and Electronics Engineering

“BEEE 2 MARKS-Answers

UNIT 1

1. What is current and give its unit?

The rate of flow of charge (Free electron) is called as current. Current is represented by ‘I’. Its unit is Ampere (A).

2. Define potential difference or voltage?

- The work done in moving a coulomb of charge between the two points is called the potential difference. It is measured in volt.
- Voltage or electro motive force (emf) represents the electric pressure or potential difference between two ends of the conductor that tends to create an electron flow.

Voltage is represented by ‘V’ (or) ‘E’. Its unit is volt

3. State ohm’s Law and mention its limitations?

At constant temperature, the current flowing through a conductor is directly proportional to the potential difference across the ends of the conductor.

$$V \propto I \text{ (or) } V = I * R.$$

Where **R** is the resistance of the conductor in ohm.

- Ohm’s law is not applicable in unilateral networks
- It is not applicable for the non-linear network.

4. State kirchoff’s law?

- KCL: It states that the algebraic sum of the currents meeting at any junction is zero. (Or) It can be also stated that the sum of current entering the junction is equal to the sum of current leaving the junction.

$$I_1 + I_2 = I_3 + I_4$$

- KVL: It states that in a closed circuit the algebraic sum of the product of the current and resistance of all the elements plus the algebraic sum of the EMFs induced in the circuit is equal to zero.(Or) It can be stated that the sum of the Potential drop is equal to the sum of the Potential rise.

$$\Sigma IR + \Sigma \text{ emf} = 0 \text{ (for DC circuits) or } \Sigma IZ + \Sigma \text{ emf} = 0 \text{ (for AC circuits)}$$

Where, R-Resistance

Z- Impedance.

5. What is expression for series and parallel resistance and mention its difference?

Series circuit:

- In a series circuit, the current through each of the component is the same.
- The voltage across the circuit is the sum of the voltages across each component.
- $R=R_1+R_2+R_3$ It shows the equivalent resistance of a combination of resistances in series is equal to the sum of individual resistance

Parallel circuit:

- In a parallel circuit, the voltages across each component is the same.
- The total current is the sum of the current through each component

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

6. What is electrical power and its unit?

- Power is the rate of doing work and its unit is Watt (or) Joule per second. It is the product of current and voltage.

$$P = V \times I \text{ (DC Circuits)}$$

7. What is resistance and its unit?

The electric resistance of a circuit component or devices is defined as the ratio of the voltage applied to the electric current which flows through it. It is represented as 'R'. Its unit is ohm(Ω).

8. Two resistor 4ohm and 6ohm are connected in parallel. If total current is 12A, find the current through each resistor.

$$I_1=7.2$$

$$I_2=4.75 \text{ solve and write the answer}$$

9. State current divided rule and voltage divided rule?

Refer notes (write formula and its explanation)

UNIT 2

1. What is peak factor?

Peak factor is defined as the ratio of Peak value to RMS value of an alternating quantity. It is also known as Amplitude or Crest factor.

$$\text{Peak Factor, } K_a = \frac{\text{PeakValue}}{\text{RMSValue}}$$

2. What is form factor?

Form factor is defined as the ratio of RMS value to average value of an alternating quantity.

$$\text{Form Factor, } K_f = \frac{\text{RMSValue}}{\text{AverageValue}}$$

3. Define RMS value?

The steady current (DC) which when flows through a given resistor for a given time produces the same amount of heat as is produced by the alternating current when flowing

through the same resistor for the same time is call RMS or Effective value of the alternating current.

$$I_{\text{RMS}} = \sqrt{\frac{i_1^2 + i_2^2 + \dots + i_n^2}{n}}$$

4. Define average value?

It is defined as the average of instantaneous values taken over one complete cycle of the wave.

$$I_{\text{avg}} = \frac{i_1^2 + i_2^2 + \dots + i_n^2}{n}$$

5. Write the expression for real power, reactive power, apparent power, power factor?

- Real power is defined as the actual power consumed in an AC circuit. It is denoted by P. Its unit is watt.

$$P = V I \cos\Phi \text{ watt}$$

Where, V – RMS value of the voltage

I – RMS value of the current

- Reactive power is defined as the power consumed by the pure reactance (Either inductive or capacitive or both) in the AC circuit. It is denoted by Q. Its unit is Volt Ampere Reactive (VAR)

$$Q = VI \sin\Phi \text{ VAR}$$

Where, V – RMS value of the voltage

I – RMS value of the current

Φ – Phase angle between V & I

Φ – Phase angle between V & I

- Apparent power is defined as the total power consumed in the AC circuit. It is given by the sum of Real and Reactive power. It is denoted by S. Its unit is Volt Ampere.

$$S = P + j Q \text{ (or) } S = V I$$

Where, P – Real Power

Q – Reactive power

V – RMS value of the voltage

I – RMS value of the current

- Power factor is defined as the Cosine of the angle between the input voltage and input current. P.F = Cos Φ

(Or) It is defined as the ratio of real power to apparent power. $P.F. = \frac{\text{Realpower}}{\text{Apparentpower}}$

It is given by P.F. = $\frac{R}{Z}$

6. What is power Factor?

Power factor is defined as the Cosine of the angle between the input voltage and input current. $P.F = \cos \Phi$

(Or) It is defined as the ratio of real power to apparent power. $P.F. = \frac{\text{Realpower}}{\text{Apparentpower}}$

It is given by $P.F. = \frac{R}{Z}$

7. What are the advantages of three phase system?

- In a three phase circuit, the total power is more uniform unlikely, in a single phase circuit the power varies widely.
- Generation, transmission and distribution of power is more economical in three phase system compared to single phase system.
- Three phase machines have better power factor and efficiency

Sl. No.	Single phase AC supply	Three phase AC supply
1	It has one conductor	It has three conductors
2	Low power applications	Huge power applications
3	It has two lines Phase(P) and Neutral line(N) for return path	It has three or four lines. <ul style="list-style-type: none"> ➤ R-Red ➤ Y-Yellow ➤ B-Blue ➤ N-Neutral ➤ In a three wire system for current flow in R phase Y & B acts as the return path and so on. ➤ Four wire system which includes Neutral is found in star connected systems

8. Write the demerits of three wattmeter method?/ Advantages of 2 wattmeter method

- Number of wattmeter required is less. i.e. only instead of three.
- Since number of wattmeter is reduced the losses due to the wattmeter coils is less and hence the accuracy is more.
- Power factor of the system can also be determined using 2-wattmeter method

9. What is the relation between line voltage and phase voltage in star and delta connection system?

Line-Line voltage or simply line voltage is defined as the voltage between any two lines of a 3-phase system. It is represented by E_L . Various line voltages are E_{RY} , E_{YB} , and E_{BR} . Phase voltage is defined as the voltage between one line and the neutral wire of a star connected system. It is represented by E_p . Various phase voltages are E_{RN} , E_{YN} , and E_{BN} . In Delta Connected System, Line voltage = Phase Voltage ($E_L = E_p$)

In Star Connected System, Line voltage = $\sqrt{3}$ Phase Voltage ($E_L = \sqrt{3}E_P$)

10. What is the relation between line voltage and phase voltage in star and delta connection system?

Line current is one which that flows in the 3 lines. It is represented by E_L . Various line currents are I_R , I_Y , and I_B .

Phase current is one which that flows between any two phases. It is represented by I_P . Various phase currents are I_{RY} , I_{YB} , and I_{BR} .

In Delta Connected System, Line current = $\sqrt{3}$ Phase current ($I_L = \sqrt{3} I_P$)

In Star Connected System, Line current = Phase current ($I_L = I_P$)

11. Define Frequency.

The number of cycles per second is defined as frequency. It is denoted by 'f'. Its unit is Hz (Hertz) or cps (cycles per second).

UNIT 3

1. State Fleming's rule

- **Left hand rule:** Stretch the thumb, forefinger and middle finger of your left hand, so that they are perpendicular to each other.

Forefinger -- Direction of Magnetic field
Middle finger -- Direction of Current
Thumb finger -- Direction of Motion of conductor.

- **Right hand rule:** Stretch the thumb, forefinger and middle finger of your right hand, so that they are perpendicular to each other.

Forefinger -- Direction of Magnetic field
Middle finger -- Direction of Induced EMF
Thumb finger -- Direction of Motion of conductor.

2. State faraday's law.

Whenever a current carrying conductor cuts the magnetic lines of force an emf is induced.

3. What is an emf equation of Generator and Transformer? Refer notes for equation

4. What is transformer and its types?

A transformer is a static device, which is used to increase or decrease the voltage level without change in frequency.

The basic principal of a transformer is Mutual induction between two coils which are linked by a common magnetic flux.

5. What is fuses and circuit breaker?

A fuse is a short piece of wire or thin strip which melts, when excessive current flows through it for sufficient time it is inserted in series with the circuit to be protected

A circuit breaker is an equipment which can open or close a circuit under all condition namely on full load condition and fault condition

6. What is condenser in power plant?

7. What is a DC generator and motor?

Whenever a conductor cuts magnetic flux, dynamically induced e.m.f is produced in it according to Faraday's laws of Electromagnetic induction. This e.m.f causes a current to flow if the conductor circuit is closed.

A DC motor is an electrical machine which converts electric energy into mechanical energy.

It is based on the principal that when a current carrying conductor is placed in a magnetic field, it experiences a mechanical force whose direction is given by Fleming's Left hand rule and the magnitude of the force is given by $F=BI l$ Newton.

8. What is called back EMF?

Back electromotive force (back emf) is a voltage that appears in the opposite direction to current flow as a result of the motor's coils moving relative to a magnetic field. It is this voltage that serves as the principal of operation for a generator.

9. What is the purpose of commutator?

Commutator is also called as split rings. Its function is to rectify i.e. to convert the alternating current induced in the armature conductors into unidirectional current in the external load circuit.

UNIT 4

1. What is rectifier and give its types?

A rectifier is defined as an electronic device for conversion of AC voltage or current into unidirectional (DC) voltage or currents. A semiconductor diode is used as a rectifier.

- Half wave rectifier
- Full wave rectifier (center tapped and bridge rectifier)

2. What is filter and give its types?

The voltage coming out from rectifies is not smooth and a filter rectifier circuit is used to smoothen it for more stable constant DC voltage.

- Series inductor filter
- LC filters are of 2 types
 - Capacitance input filter
 - Inductance input filter
- RC filters

3. Draw the circuit diagram for half wave rectifier ? Refer notes for diagram

4. What is a transistor? And its types

- Transistor is a device that regulates current or voltage flow and acts as a switch or gate for electronic signals. Transistors consist of three layers of a semiconductor material, each capable of carrying a current.
- Transistor is a semiconductor device used to amplify or switch electronic signals and electric power.
- It revolutionized the field of electronics and paved the way for smaller and cheaper radios, calculators, computers, etc.

There are 3 types of transistor circuit configurations

- Common base (CB) configuration
- Common emitter (CE) configuration
- Common collector (CC) configuration

5. What is oscillator and its types?

A device which works on the principle of positive feedback, producing the waveform of desired frequency is called an oscillator.

- RC- phase shift oscillator
- Hartley oscillator

6. Draw the VI characteristics of diode. Refer notes for diagram

7. Compare JFET and MOSFET.

- Comparing to the JFET, MOSFETs are easier to fabricate.
- JFETs are operated only in the depletion mode. The depletion type MOSFET may be operated in both depletion and enhancement mode.
- The output characteristics of JFET is flatter than the MOSFET. because the drain resistance in the JFET is higher than the MOSFET
- The gate leakage current of JFET is of the order of 10^{-9} A. For MOSFET, the gate leakage current will be of the order of 10^{-12} A.
- The input resistance of JFET is in the range of $10^8\Omega$. For MOSFET, the input resistance will be in the range of 10^{10} to $10^{15}\Omega$.

8. Write the three terminals of BJT and FET.

The three terminals of FET are Gate, Source and Drain. The **Source** terminal in FET is analogous to the Emitter in BJT, while **Gate** is analogous to Base and **Drain** to Collector. A Bipolar junction transistor, shortly termed as **BJT** is called so as it has two PN junctions for its function. The three terminals of the BJT are the base, the collector and the emitter. A signal of small amplitude if applied to the base is available in the amplified form at the collector of the transistor.

9. Define amplifier

An amplifier is a device which amplifies or increases magnitude of any current or voltage applied as its input.

10. Is the common collector configuration used for amplification?

The common collector circuit has very high input resistance and very low output resistance. Due to this reason, the voltage gain provided by this circuit is always less than 1. Therefore this circuit arrangement is seldom used for amplification.

UNIT 5

1. State De Morgan's theorem.

Theorem 1: It that the complementary of a sum is equal to the product of complement,

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

Theorem 2: It says the complementary of a product equals the sum of complements

$$\overline{A.B} = \overline{A} + \overline{B}$$

2. What is flipflop and mention its types?

It is a sequential device that samples its input and changes its output only at the time which is determined by the clocking signal.

- J-K flip flop
- RS Flip flop
- T flip flop
- D flip flop

3. Draw the logic diagram of any of the logic gate with its truth table. Refer notes

4. What is shift register and its types.

A register is a group of flip flop that can be used to store a binary number. Register has a variety of application in digital system including microprocessor.

- Parallel in parallel out shift register
- Parallel in serial out shift register
- serial in Parallel out shift register
- serial in serial out shift register

5. Define counter.

A digital circuit used for counting. Counter is divided into synchronous and asynchronous counter. The change of the state of a particular flip flop is depending on the present state of other flip flop.

6. Design OR gate using universal gate NAND refer notes

7. State associate law of Boolean algebra.

Boolean expression also has commutative, associative, and distributive properties as listed below:

- Commutative: $A \cdot B = B \cdot A$ and $A + B = B + A$
- Associative: $(A \cdot B) \cdot C = A \cdot (B \cdot C)$ and $(A + B) + C = A + (B + C)$
- Distributive: $A \cdot (B + C) = A \cdot B + A \cdot C$
- De Morgan's laws

8. Define adder and differentiate half adder and full adder.

Half adder: The logic circuit which performs the arithmetic sum of two bits is called half adder

Full adder: The logic circuit which performs the arithmetic sum of 3 bits and carries from the previous addition

Half subtractor: The logic circuit which performs the subtraction between two bits is called half subtractor

Full subtractor: It is combination circuits that perform a subtraction between 2 bits. It also takes into account borrow of the lower significant stage.

9. Draw the truth table and diagram for JK flipflop.

The input J and K behave like inputs S and R to set and clear the flip flop respectively. The input J is for set and the input K for reset. If J=K=1, then output switched to the complementary state of Q is called toggle state. Example: Q=1 then Q(t+1)=0 and vice versa

For table and diagram refer notes

10. Define Sequential Logic and combinational logic

Sequential logic	combination logic
It has memory	No memory
Depends on present as well as previous state	Depends only on present state
Example: shift register , ripple counter	Example: ADDER , SUBTRACTOR

11. What is the drawback in RS flip flow?

The output of RS flip flop is undefined when both inputs are high at the clock pulse. This is usually undesirable and it is the drawback in RS flip flop.

UNIT 6

1. Define Communication and its basic types.

Communication is a process of transfer of information bearing signal from one place to another.

- Wire communication: Parallel wire, coaxial cable and optical fiber communication.
- Wireless communication: Microwave, satellite, and cellular mobile communication system

2. What are the advantages of optical fibre communication?

- Optical fibers are used for transmission of optical signal in the same manner of coaxial cable for radio wave transmission
- High Bandwidth

- Easy to accommodate increasing bandwidth
- Resistance to electromagnetic interference
- Early detection of cable damage and secure transmission

Application:

- International communication
- Inter-city communication
- Inter-exchange communication
- Data links
- Domestic communication
- Plant and traffic control etc.

3. What is Cellular communication?

A cell phone is a portable telephone which has been used for making communication through a cell site or transmitting tower

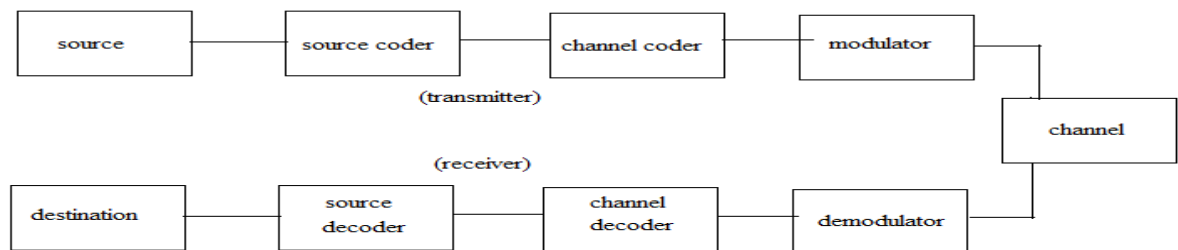
4. What is mean by WAN

A Wide Area Network (WAN) is a computer network that covers a broad area (i.e., any network whose communications links cross metropolitan, regional, or national boundaries).

5. Write a short note on ISDN.

An ISDN is a network, which provides end to end digital connectivity between user to support a wide range of service including voice and non-voice.

6. Sketch the block diagram of basic communication system.



7. Write a note on Microwave communication.

Electromagnetic waves in the frequency range of 1 GHz to 30 GHz are referred to as microwaves.

8. Define the network model? And its types

A network consists of two or more computer that is linked in order to share resource, exchange files or allow electronic communication

- Metropolitan Area Network (MAN)
- Wide Area Network (WAN)
- Local Area Network (LAN)

9. **State the disadvantage of satellite communication system.**

Disadvantage of satellite communication system:

- There is a large time delay of 250 mill sec between the transmission and reception of a signal. The malfunctions in the satellite are highly difficult to correct.
- The initial cost involved is quite large.

10. **Write a short note on circuit switching.**

Circuit switching is used for making standard telephone call on the public telephone networks.

Circuit-switched communication involves three phases:

Circuit Establishment->Data Transfer->Circuit Release