

VIVA QUESTIONS & ANSWERS

## 1. What is current?

An electric circuit is formed when a conductive path is created to allow free electrons to continuously move. (This continuous movement of free electrons through the conductor of a circuit is called a current)

## 2. What is voltage?

(Voltage is the difference in electrical potential between two points in a circuit.) It's the push or pressure behind current flow through a circuit, and is measured in (V) volts. The force motivating electrons to "flow" in a circuit is called voltage.

## 3. What is resistance?

Free electrons tend to move through conductors with some degree of friction, or opposition to motion. This opposition to motion is more properly called resistance.

## 4. What is ohm's law?

Ohm's Law deals with the relationship between voltage and current in an ideal conductor. This relationship states that:

The potential difference (voltage) across an ideal conductor is proportional to the current through it. The constant of proportionality is called the "resistance", R. Ohm's Law is given by:

$$V = I R$$

## 5. What do you mean by load?

The term "load" can also mean "the amount of power" or "the amount of current" drawn by the thing that is connected to the output of the circuit.

## 6. What is a transformer and how does it work?

A transformer is a static device, which transfer electrical power from one circuit to another circuit without changing frequency. It works on mutual induction principle.

## 7. What do you mean by squirrel cage induction motors?

Those induction motors which employ squirrel cage rotor are called squirrel cage induction motors.

## 8. Why the starting torque of Squirrel cage induction motor is LOW?

It is because the rotor bars are permanently short-circuited, and it is not possible to add any external resistance to the rotor circuit to have a large starting torque.

## 9. How Rotating Magnetic Field is produced in three phase induction motor?

When a 3-phase winding is energized from a 3-phase supply, the 3 fluxes interacts with each other and results in a rotating magnetic field



**10. What is Synchronous speed?**

Speed at which the revolving flux rotates is called synchronous speed ( $N_s$ ).

**11. Why cannot 3-phase induction motor run at synchronous speed?**

If it did, there would be no relative movement between the stator field and rotor conductors and, therefore, no torque to drive the motor. Hence 3-phase induction motor can never run at synchronous speed.

**12. What are the disadvantages of wound rotor motors compared to squirrel cage motors?**

The wound-rotor motors have the following disadvantages as compared to squirrel cage motors:

- (i) The initial and maintenance costs are greater than that of squirrel cage motors.
- (ii) Poor speed regulation when run with resistance in the rotor circuit.

**13. What are the advantages of skewed slots in the rotor of a squirrel cage motor?**

- (iii) It reduces motor noise and vibration.
- (iv) It increases the starting torque and reduces the starting current.
- (v) It increases the rotor resistance due to increased length of rotor bars.

**14. How is magnetic leakage reduced to a minimum in commercial transformers?**

By interleaving the primary and secondary windings.

**15. Mention the factors on which hysteresis loss depends?**

Quality and amount of iron in the core

Flux density and

Frequency.

**16. How can eddy current loss be minimized?**

By laminating the core.

**17. In practice, what determines the thickness of the laminate or stampings?**

Frequency.

**18. Does the transformer draw any current when its secondary is open?**

Yes, no-load primary current.

For supplying no-load iron and copper losses in primary.

**19. Is Cu loss affected by power factor?**

Yes, Cu loss varies inversely with power factor.

**20. Name the two different theories with which principle of 1-phase induction motors are explained.**



The two different theories are

(b) Double revolving field theory

(c) Cross field theory

**21. Name any four types of 1-phase induction motors.**

Based on the method of starting arrangement provided, the 1-phase Induction motor is classified as follows

- i. Split-phase motor
- ii. Capacitor start motor
- iii. Capacitor start and run motor
- iv. Shaded pole motor
- v. Repulsion start Induction run motor

**22. Why are centrifugal switches provided on many 1-phase Induction motors?**

Centrifugal switches are provided on many 1-phase Induction motors to disconnect auxiliary winding from the supply when the motor reaches about 70% of its synchronous speed.

**23. How is the direction of a capacitor start Induction motor be reversed?**

The direction of rotation can be reversed by interchanging the terminals of either the main winding or the starting winding.

**24. Induction motor can run at synchronous speed? True or false? Explain.**

No, if the speed of induction motor is  $N_s$  then the relative speed between the rotating flux and rotor will be zero and so no torque is produced.

**25. An induction motor is generally analogous to?**

It is analogous to a winding rotating transformer with its secondary circuit closed.

**26. Can the starting torque of a slip ring induction motor be increased?**

Yes. It can be increased by adding resistances to the rotor circuit.

**27. What would happen if a 3 phase induction motor is switched on with one phase disconnected?**

The motor is likely to burn.

**28. What happens if the air gap flux density in an induction motor is increased?**

The increase in air gap flux increases iron loss and hence efficiency decreases.

**29. State the advantages of skewing?**

It reduces humming and hence quiet running of motor is achieved. It reduces magnetic locking of the stator and rotor.



30. State the condition at which the starting torque developed in a slip-ring induction motor is maximum.

When  $R_2 = X_2$

31. What is slip of an induction motor?

The slip speed expressed as the ratio of synchronous speed is defined as slip. Percentage slip

$$S = \frac{N_s - N}{N_s} \times 100$$

32. How is the magnitude of rotor EMF related to the slip in an I M?

Rotor circuit EMF per phase  $E_{2r} = SE_2$

33. How the frequency of rotor emf is related to the slip in an I M?

Frequency of rotor EMF/current  $f_r = S f_s$

34. What is the normal value of slip of an I M operating at full load?

3 - 5%

35. Why is not possible for the rotor speed of an I M to be equal to the speed of its rotating magnetic field?

The machine will not be able to develop any mechanical torque to run as a motor.

36. What are the losses occurring in an IM

Magnetic losses ( $W_i$ ), Electrical losses ( $W_{cu}$ ), Mechanical losses ( $W_m$ )

37. What is circle diagram of an I M?

This circle diagram is used to predict the performance of the machine at different loading conditions as well as mode of operation.

38. What type of single phase induction motor would you use for the following applications?

i) Ceiling fan (ii) Wet grinder

Ceiling fan – capacitor start and run motor

Wet grinder – capacitor start motor

39. After servicing a single phase fan it was found to run in reverse direction. What could be the reason?

The connection to the starting/ auxiliary winding would have reversed.

40. What is the property of a single phase single winding induction motor?

It has zero starting torque



- ✓ 41. Which winding in a double cage induction motor has high resistance and low inductance?

Outer cage winding

- ✓ 42. Give the expression of three phase power.

$$\sqrt{3} * V * I * \cos \phi$$

- ✓ 43. Does power factor of load effect the wattmeter reading?

Yes. When the load operates at a power factor other than unity, there will be greater losses in the distribution system conductors due to  $I^2R$  for each phase. Since the magnitude of the current is greater when the power factor is less than unity, the distribution system losses will be greater. The watt-hour meter will register those losses which are down stream of the meter. for each phase. Since the magnitude of the current is greater when the power factor is less than unity, the distribution system losses will be greater. The watt-hour meter will register those losses which are down stream of the meter.

44. If one of the wattmeter reads zero, what is the power factor of the load?

as per formula,  $\tan \theta = 1.732 (W_1 - W_2) / (W_1 + W_2)$ .

$$\text{So } \tan \theta = 1.732 (0.5 - 0) / (0.5 + 0).$$

$$\text{So } \tan \theta = 1.732.$$

$$\text{so } \theta = 60.$$

$$\cos 60 = 0.5.$$

Hence the power factor will be 0.5

- ✓ 45. Can we Determine Reactive Power by Two Wattmeter Method?

Yes we can determine by the equation

Reactive Power is given by the equation shown below.

$$P_r = \sqrt{3} (W_1 - W_2)$$

- ✓ 46. Define earth resistance.

The resistance offered by the earth electrode to the flow of current into the ground is known as the earth resistance or resistance to earth.

47. What is the standard value of earth resistance?

5 Ohms

48. What is the instrument used to measure earth resistance?



## Earth Tester

**49. What is earthing?**

The process of transferring the immediate discharge of the electrical energy directly to the earth by the help of the low resistance wire is known as the electrical earthing.

**50. Why earthing is needed?**

Earthing System or Grounding System in an electrical network work as a safety measure to protect human life as well as equipment, the main objective of the Earthing system is to provide an alternative path for dangerous currents to flow so that accidents due to electric shock and damage to the equipment can be avoided.

**51. What is megger?**

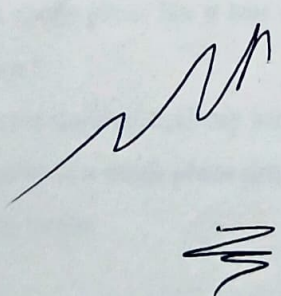
Megger is a measuring instrument used for the measurement of insulation resistance of an electrical system. An electrical system degrades its quality of insulation resistance with time and various environmental conditions including temperature, moisture, dust particles & humidity.

**52. What is the application of two way switch?**

Two way lamp control is used in stair case lighting applications or in big halls for controlling the lamp from two different points.

**53. Why is three way switch required?**

A lamp can be controlled from three different locations. The circuit needs an intermediate switch along with two number 2-way switches. Intermediate has two states namely straight and cross connection. Application of three-Conduct way control is corridor lighting, stair case lighting, bedroom lighting, cellars lighting etc.





### QUESTION BANK

1. Conduct an experiment to verify KVL and KCL in a DC circuit.
2. Conduct an experiment to compare measured current, power and power factor of Incandescent Lamp, Fluorescent Lamp and LED Lamp
3. Conduct an experiment to measure the Resistance and Inductance of a choke coil using 3 Voltmeter method.
4. Conduct an experiment to determine phase and line quantities of voltages and currents in three phase star and delta connected resistive load
5. Conduct an experiment to show two 1-phase watt-meters are sufficient for measuring 3-phase power by using star connected load.
6. Conduct an experiment to show two 1-phase watt-meters are sufficient for measuring 3-phase power by using delta connected load.
7. Conduct an experiment to realize two way and three way control of lamp and form the respective truth tables.
8. Conduct an experiment to measure the earth resistance.
9. Conduct an experiment to study the effect of OPEN and SHORT circuit in simple circuit.



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The surface dark current component can change over time due to ambient moisture. It is also susceptible to surface cleanness, surface contamination, i.e. sodium from hand grease could increase the dark current significantly. The bulk dark current should not increase over time.

4 What is the difference between the Photoconductive (PC) and photovoltaic (PV) modes?

In the photovoltaic mode, the photodiode is neither operated nor biased. It is simply acting like a solar cell, which converts light into electricity. In the Photoconductive mode, however, the photodiode can be Reversed Biased by voltages up to the specified maximum reverse voltage.

5 What happens if the photodiode is biased with a voltage larger than the specified maximum reverse bias?

A device may experience reverse bias breakdown if biased over the maximum value we specify, a high current will flow through the device which could lead to the destruction of the photodiode. We do not recommend that you operate this device in this manner.

6 Is there a specific type of power supply used to bias the photodiode?

A stable DC voltage source is all that is required to reverse bias a photodiode. The supply's current requirements are minimal, since the device produces its own current.

7 How much reverse bias should I apply?

Apply a sufficiently high reverse bias only to get the bandwidth you but low enough to avoid the risk of reaching the reverse breakdown voltage. Increasing the reverse voltage increases the response speed of the photodiode, by reducing the junction capacitance

8 Mention three major types of photodiodes are available in the market?

The three major types of photodiodes

i) PN junction photodiode ii) PIN junction photodiode, iii) Avalanche photodiode (APD).

9 Does photodiode behave like current sources when illuminated explain?

A photodiode behave like a current source when illuminated. When operated without bias, the current is distributed between the shunt resistance and external load resistor in this mode, a voltage is developed which creates forward bias, thus reducing its ability to remain as a constant current source. When operated with reverse bias, the photodiode becomes an ideal current source

10 What is the output signal of a photodiode?

Photodiode operates as a voltage source as well a current source in response to the incident light in the wavelength range of 200 nm to 1100 nm. The current measurement is preferred since the output current changes linearly with incident light power. The voltage output, however, changes logarithmically with incident light power.

11 How do you measure exact responsivity, explain?

The external conversion efficiency of white LED is 0.66 gives the exact responsivity of the photodiode.

12 In which bias photo diode is sensitive?

It is sensitive in reverse bias



- 12/ The word LASER stands for what?  
It is Light Amplification by Stimulated Emission of Radiation
- 13/ What is the difference between interference & diffraction?  
Interference of light takes place due to superposition of two waves coming from two coherent sources while diffraction is due to interference between the component parts of Wave front
- 14 What is the basic principle of laser?  
Radiation interacts with matter under appropriate conditions. The interaction leads to an abrupt transition of quantum system such as an atom or molecule from one energy state to another. If the transition is from higher state to lower state, the system gives out part of its energy and if the transition is in the reverse direction, then it absorbs the incident energy.
- 15/ What is the effect of no of rulings on the diffraction spectrum?  
Higher the no of rulings on the grating we get less orders with more gaps
- 16/ Define wave length?  
It is distance travelled by a wave at end of one second
- 17 Define principle maxima and secondary maxima?  
A principle maxima is formed by those secondary wavelets which travel normal to the slit in addition to secondary maxima between equally space minima.
- 18/ Distinguish between transmitting & reflecting grating?  
If rulings are drawn on a transparent glass plate by a diamond point it is called transmitting grating. If the rulings are drawn on a silvered glass plate then it is called reflecting grating.
- 19 What is the effect of grating element on the diffraction pattern?  
Larger the ruled surface (grating element) smaller will be the angular half width and sharper are the maxima.
- 20 Distinguish between polychromatic and monochromatic sources?  
Polychromatic source is one, which produces radiations having different wavelengths. Ex. Mercury vapor lamp. Monochromatic source is one which produces radiations of single wavelength, Ex. Sodium vapor lamp