Model Viva Questions for "Fundamental of electrical Engineering"
Common to: ET&T I SEM
Title of the Practical: Verify Ohm's Law.

Q1: What is current?
A1: 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 conductors of a circuit is called a current, and it is often referred to in terms of "flow," just like the flow of a liquid through a hollow pipe. Current is measured in amperes (A).

Q2: What is voltage?
A2: 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. When we speak of a certain amount of voltage being present in a circuit, we are referring to the measurement of how much potential energy exists to move electrons from one particular point in that circuit to another particular point.

Q3: What is resistance?
A3 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. The amount of current in a circuit depends on the amount of voltage available to motivate the electrons, and also the amount of resistance in the circuit to oppose electron flow. For this reason, the quantities of voltage and resistance are often stated as being "between" or "across" two points in a circuit. A very high resistance allows a small amount of current to flow. A very low resistance allows a large amount of current to flow. Resistance is measured in ohms (Ω).

Q4: What is ohm's law?
A4: 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:

$$V = I R$$

Q5: Ohm's law is valid for what type of circuit?
A5: Ohm's law holds for circuits containing only resistive elements (no capacitances or inductances) for all forms of driving voltage or current, regardless of whether the driving voltage or current is constant (DC) or time-varying such as AC. At any instant of time Ohm's law is valid for such circuit's .Resistors which is in series or in parallel may be grouped together into a single "equivalent resistance" in order to apply Ohm's law in analyzing the circuit. Material that obeys Ohm's Law is called "ohmic" or "linear" because the potential difference across it varies linearly with the current.

Q6: What is the precaution should be taken during the operation?
A6: Precautions:-
1) Connection should be making properly.
2) Circuit should be handling carefully.
3) Circuit should be turn on when taking readings.

Q7: How can use ohm's law?
A7: Ohm's Law can be used to solve simple circuits. A complete circuit is one which is a closed loop. It contains at least one source of voltage (the battery), and at least one source of resistance to current i.e., a place where potential energy decreases. The sum of the voltages around a complete circuit is zero. This makes it very easy to apply Ohm's Law. If we know the values of any two of the three quantities (voltage, current, and resistance) in this circuit, we can use Ohm's Law to determine the third.

Q8: Who discover the ohm's law?
A8: The first, and perhaps most important, relationship between current, voltage, and resistance is called Ohm's Law, discovered by George Simon Ohm and published in his 1827 paper, The Galvanic Circuit Investigated Mathematically.

Q9. What are the limitations of ohm's law?
A9. The main limitations of ohm's law are: it is valid for the conductors whose physical dimensions are not change with the variation of temperature.

Q10: Explains Insulator, metal and semiconductor?
A10: **Insulator: -** insulator is a material which does not allow to flow of current trough itself is called insulator. Example: - wood, glass etc
Conductor:- metal is a material which allow to flow of current trough itself is called Conductor. Example: - Al, Ag, Steel etc.
Semiconductor: - a semiconductor is a material which has the resistivity in between semiconductor and insulator. Example: - Ge, Si, C etc

Title of the Practical: Verify KCL & KVL.

Q1 what is Kirchoff's law?
A1 Kirchhoff's circuit laws are two equalities that deal with the conservation of charge and energy in electrical circuits, and were first described in 1845 by Gustav Kirchhoff. Widely used in electrical engineering, they are also called Kirchhoff's rules or simply Kirchhoff's laws. Both circuit rules can be directly derived from Maxwell's equations, but Kirchhoff preceded Maxwell and instead generalized work by George Ohm.

Q2 What is Kirchoff's current law (KCL)?
A2 This law is also called Kirchhoff's point rule, Kirchhoff's junction rule (or nodal rule), and Kirchhoff's first rule. The principle of conservation of electric charge implies that:
When performing calculations, current flowing into and out of the junction typically has opposite signs. This allows Kirchhoff's Current Law to be restated as:
At any node (junction) in an electrical circuit, the sum of currents flowing into that node is equal to the sum of currents flowing out of that node.

Or

The algebraic sum of currents in a network of conductors meeting at a point is zero.

Q3 what do you mean by junction (node)?
A3 A junction - a point where three or more conductors meet.

Q4 what direction should be assumed for KCL?
A4 The direction of incoming currents to a node being positive the outgoing current should be taken negative.

Q5 Formula for KCL?
A5 Recalling that current is a signed (positive or negative) quantity reflecting direction towards or away from a node; this principle can be stated as:

$$\sum_{k=1}^{n} I_k = 0$$

n is the total number of branches with currents flowing towards or away from the node.

Q6 Kirchhoff's Current Law in action?
A6 A junction of four conductors (i.e. wires). If the currents i_2 and i_3 are flowing into the junction, while i_1 and i_4 flow out of it. In this example, Kirchhoff's Junction Rule yields the following equation:

$$i_2 + i_3 = i_1 + i_4$$

Q7 what is Kirchoff's voltage law (KVL)?
A7 This law is also called Kirchhoff's second law, Kirchhoff's loop (or mesh) rule, and Kirchhoff's second rule
Kirchhoff's Voltage Law describes the distribution of voltage within a loop, or closed conducting path, of an electrical circuit. Specifically, Kirchhoff's Voltage Law states that:
The algebraic sum of the voltage (potential) differences in any loop must equal zero.

Or

The algebraic sum of the products of the resistances of the conductors and the currents in them in a closed loop is equal to the total emf available in that loop.

Q8 Formula for KCL?
A8 The directed sum of the electrical potential differences (voltage) around any closed circuit is zero. Similarly to KCL, it can be stated as:

$$\sum_{k=1}^{n} V_k = 0$$

Here, n is the total number of voltages measured.

Q9 what are the Positive and Negative Signs in Kirchhoff's Voltage Law?
A9Using the Voltage Rule requires some sign conventions. Choose a direction (clockwise or counter-clockwise) to go along the loop. When traveling from positive to negative in a power source the voltage drops, value is negative. When going from negative to positive the voltage goes up, so the value is positive. When crossing a resistor, the voltage change is determined by the formula I*R. Crossing in the same direction as the current means the voltage goes down, so its value is negative. When crossing a resistor in the direction opposite the current, the voltage value is positive (the voltage is increasing).

Q10 Application of Kirchhoff's Law?
A10 Kirchhoff's Law is used to solve electrical circuit.

Title of the Practical: Measure voltage & current in RLC series circuit,Calculate impedance,inductance, capacitance, & power factor, Draw vector diagram

Q1 what do you mean by a series circuit?
A1 The circuit in which number of resistors are connected end to end so that same current flow through them is called series circuit

Q2 what do you mean by AC voltage?
A2 A voltage that changes its polarity and magnitude at regular intervals of time is called an AC voltage.

Q3 what do you mean by 'Cycle'?
A3 When an alternating quantity goes through a complete set of positive & negative value or goes through 360 electrical degrees, it is said to be complete a 'cycle'.

Q4 what do you mean by a time period?
A4 The time taken in seconds to complete one cycle by an alternating quantity is called a time period.

Q5 what do you mean by Frequency?
A5 The no. of cycles made per second by an alternating quantity is called a Frequency.

Q6 what do you mean by Amplitude?
A6 The maximum value attained by an alternating quantity in one cycle is called it's amplitude or peak value or maximum value.

Q7 what do you mean by Phase Difference?
A7 The angular displacement between the max positive value of the two alternating quantities having the same frequency is called phase difference.

Q8 what do you mean by Average Value?
A8 The arithmetic average of all the instantaneous values considered of an alternating quantity over one cycle is called average value.

Q9 what do you mean by Instantaneous Value?
A9 The value of an alternating quantity at any instant is called it's instantaneous value.

Q10 what do you mean by RMS value?
A10 The steady current which when flow through a resistor of known resistance for a given time produces the same amount of heat as produced by the alternating current when flows through the same resistor for the same time is called RMS value of the alternating current.

Title of the Practical: Measure voltage & current in RLC parallel circuit.Alsocalculate impedance, power factor, and Draw vector diagram.

Q1 what do you mean by a parallel circuit?
A1 The circuit in which one end of all the resistors is joined to a common point and the other ends are also joined to another common point so that a different current flow through them is called parallel circuit.

Q2 what is capacitor?
A2 A capacitor is a passive electronic component consisting of a pair of conductors separated by a dielectric A capacitor is assumed to be self-contained and isolated, with no net electric charge and no influence from any external electric field. The conductors thus hold equal and opposite charges on their facing surfaces, and the dielectric develops an electric field. In SI units, a capacitance of one farad means that one coulomb of charge on each conductor causes a voltage of one volt across the device.

Q3 what is the use of capacitor?
A3 capacitors are widely used in electronic circuits for blocking direct current while allowing alternating current to pass, in filter networks, for smoothing the output of power supplies, in the resonant circuits that tune radios to particular frequencies and for many other purposes.

Q4 How to express capacitor?
A4 An ideal capacitor is wholly characterized by a constant capacitance C, defined as the ratio of charge ±Q on each conductor to the voltage V between them:[8]

$$C = \frac{Q}{V}$$

Sometimes charge build-up affects the capacitor mechanically, causing its capacitance to vary. In this case, capacitance is defined in terms of incremental changes:

$$C = \frac{\mathrm{d}q}{\mathrm{d}v}$$

Q5 what is Power Factor?
A5 The power factor of an AC electric power system is defined as the ratio of the real power flowing to the load to the apparent power in the circuit, and is a dimensionless number between 0 and 1 (frequently expressed as a percentage, e.g. 0.5 pf = 50% pf). Real power is the capacity of the circuit for performing work in a particular time. Apparent power is the product of the current and voltage of the circuit. Due to energy stored in the load and returned to the source, or due to a non-linear load that distorts the wave shape of the current drawn from the source, the apparent power will be greater than the real power. Power Factor is a measure of how efficiently electrical power is consumed

Q6 How to measure power factor?
A6 Power factor in a single-phase circuit (or balanced three-phase circuit) can be measured with the wattmeter-ammeter-voltmeter method, where the power in watts is divided by the product of measured voltage and current. A direct reading power factor meter can be made with a moving coil meter of the electrodynamics type, carrying two perpendicular coils on the moving part of the instrument. The field of the instrument is energized by the circuit current flow.

Q7 what causes Power Factor to change?
A7 Inductive loads cause the AMPS to lag behind the VOLTS. The wave forms of VOLTS and AMPS are then "out of phase" with each other. The more out of phase they become then the lower the Power Factor. Power Factor is usually expressed as CosØ.

Q8 Why do need Power factor correction?

A8 Capacitive Power Factor correction (PFC) is applied to electric circuits as a means of minimizing the inductive component of the current and thereby reducing the losses in the supply.

Q9 what is automatic power factor correction unit?
A9 An automatic power factor correction unit is used to improve power factor. A power factor correction unit usually consists of a number of capacitors that are switched by means of contactors. These contactors are controlled by a regulator that measures power factor in an electrical network. To be able to measure power factor, the regulator uses a current transformer to measure the current in one phase.

Q10 what are Power Factor Correction capacitors?
A10 The introduction of Power Factor Correction capacitors is a widely recognized method of reducing an electrical load, thus minimizing wasted energy and hence improving the efficiency of a plant and reducing the electricity bill. It is not usually necessary to reach unity, i.e. Power Factor 1, since most supply companies are happy with a PF of 0.95 to 0.98

Title of the Practical: Observe different waveform on C.R.O. to calculate time period, maximum value, cycle, frequency etc. of A.C. waveform.

Q1 what is Cathode ray oscilloscope (CRO)?
A1 Cathode ray oscilloscope is a instrument used for display, measurement and analysis of waveforms and other phenomenon in electrical and electronic circuit

Q2 what are the basic component of a CRO?
A2 CRO Circuit consists of following components:
1. Vertical deflection system 2. Horizontal deflection system 3.Synchronization circuit
4. Blanking circuit 5 Intensity modulation 6position control
7. Focus control 8. Cathode ray tube 9. Calibration circuit

Q3 what is the function of probe in CRO?
A3 The probe performs the very important function of connecting the test circuit to oscilloscope without altering, loading or otherwise disturbing the test circuit.

Q4 how many types of probe used in CRO?
A4 There are three types of probe used in CRO:
1 Direct probe 2. Isolation probe 3. Detector probe

Q5 what are the functions of different probes used in CRO?
A5 Direct Probe: direct probe avoids stay-pick up which may create problems when low level signals are being measured. It is used for low frequency or low impedance circuit.
Isolation probe: Isolation probe is used in order to avoid the undesirable circuit loading effects of the shielded probe.
Detector probe: when analyzing the response to modulated signals used in Communications equipment like AM, FM and TV receivers, the detector probe functions to separate the low frequency modulation component from the high frequency carrier.

Q6 what is the function of Attenuator in CRO?
A6 The voltage in input terminal of the vertical amplifier causes the beam to deflect off the CRT screen is quite low in amplitude. So that high amplitude signals may be displayed, an attenuator network is placed between the vertical input terminals of the vertical amplifier. The main function of the attenuator is to reduce the amplitude of the vertical input signal before applying it to vertical amplifier.

Q7 which device is used for the source of emission of electrons in a CRT?
A7 A barium and strontium oxide coated cathode is used for the source of emission of electrons in a CRT.

Q8 what is the function of Aquadag in a CRO?
A8 An Aqudage is used in a CRO to collect secondary emission electrons.

Q 9 what is the function of electron gun assembly used in CRT?
A9 The electron gun assembly produces a sharply focused beam of electrons which are accelerated to high velocity .this focused beam of electrons strikes the fluorescent screen with sufficient energy to cause a luminous spot on the screen.

Q 10 what is the function of electron gun used in CRT?
A10 The source of focused and accelerated electrons beam is the electron gun. The electron gun emits electrons and forms them into a beam consist of a heater, a cathode, a grid, a pre-accelerating anode, a focusing anode and an accelerating anode.

Title of the Practical: Calculate transformation ratio of single phase transformer.

Q1 what do you mean by a transformer?
A1 A static machine which transfers ac electrical power from one circuit to the other at same frequency by at different voltage level is called transformer.

Q2 what do you mean by Transformer on load condition?
A2 When a transformer is loaded the secondary ampere turn setup a field in opposite direction to the main field, then transformer is called in load condition.

Q3 what do you mean by an auto transformer?
A3 A transformer having only one winding, a part of which acts as a primary & the other as a secondary is called an auto transformer.

Q4 what do you mean by a leakage flux of a transformer?
A4 A part of the flux produced by a winding which is not linking with the other is called leakage flux.

Q5 what do you mean by "turn ratio of a transformer"?
A5 The ratio of primary to secondary turns of a transformer is called Turn's Ratio.

Q6 what do you mean by Transformation ratio of a transformer?
A6 The ratio of secondary voltage to primary voltage is called voltage transformation ratio of a transformer.

Q7 what do you mean by an ideal transformer?
A7 An ideal transformer is one which has no ohmic resistance & no magnetic leakage flux i.e. all the flux produced in the core links with primary as well as secondary.

Q8 what do you mean by mutual flux?
A8 The flux that links with both the windings of the transformer is called mutual flux.

Q9 what do you mean by voltage regulation?
A9 At a constant supply voltage the change in secondary terminal voltage from no load to full load with respect to no load voltage is called voltage regulation of the transformer.

Q10 Explain losses in transformer?
A10 The losses which occur in an actual transformer are- 1. Core losses, 2. Copper losses.

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Title of the Practical: Perform open circuit test on single-phase transformer.

Q1 Name the test performed on transformer?
A1 There are two type of test performed on transformer: 1 open circuit test 2 short circuit test

Q2 why open circuit test is performed on transformer?
A2 open circuit test is used to estimate the iron losses of a transformer.

Q3 why short circuit test is performed on transformer?
A3 Short circuit test is used to estimate the copper losses of a transformer.

Q4 what do you mean by core losses of a transformer?
A4 The alternating flux is setup in the core, therefore hysteresis & eddy current losses occur in the magnetic core. The core losses are due to hysteresis losses & eddy current losses

Q5 what do you mean by hysteresis loss?
A5 When the magnetic material is subjected to reversal of flux power is required for the continuous reversal of molecular magnets. This power is dissipated in the form of heat & is known as hysteresis loss.

Q6 how hysteresis losses are minimized?
A6 The hysteresis loss can be minimized by using Si steel material for the construction of core. Loss.
Q7 what do you mean by Eddy current loss?
A7 Since the flux in a transformer core is alternating, it links with the magnetic material of the core. This induces emf in the core & circulates eddy current. Power is required to maintain this eddy current. This power is dissipated in the form of heat & is known as eddy current

Q8 how eddy current loss is minimized?
A8 Eddy current loss can be minimized by making the core of the thin laminations.

Q9 what do you mean by Copper Loss?
A9 Copper Losses occur in both the primary & secondary windings due to their ohmic resistance.

Q10 what do you mean by efficiency of a transformer?
A10 The efficiency of a transformer is defined as the ratio of output power to the input power.

Title of the Practical: Perform short circuit test on single-phase transformer.

Q1 why short circuit test is performed on transformer?
A1 Short circuit test is used to estimate the copper losses of a transformer.

Q2 how short circuit test is performed on transformer?
A2 In this the secondary winding is short circuited by a thick conductor and a small voltage is applied to the other windings and it is increased casually, till the full load currents circulae,both in the primary and secondary windings. Then the reading of wattmeter indicates the copper losses.

Q3 what do you mean by All Day Efficiency of a transformer?
A3 All Day Efficiency of a transformer is defined as the ratio of output in KW-H to input in KW-H of a transformer over 24 hours.

Q4 what do you mean by an electrostatic induction?
A4 Electrostatic induction is a phenomenon due to which an unchanged conducting body becomes charged merely by the nearness of a charged conducting body.

Q5 State the first law of electrostatic induction?
A5 First law of electrostatic induction state that like charges repel while unlike charges attract each others.

Q6 State the Second law of electrostatic induction?
A7 Second law of electrostatic induction state that the force of attraction or repulsion between two small charges bodies is:
1. Directly proportional to the product of the charges.
2. Inversely proportional to the square of the distance between them and
3. Dependent upon the nature of the surrounding medium

Q8 what do you mean by an electric field?
A8 Electric field is the region or space surrounding an electric charge in which the effect of charge is readily experienced.

Q9 Explain electric flux?
A9 Electric flux is total number of lines of force in any particular field. Their unit is coulomb.

Q10 Explain electric flux Density?
A10 Electric flux density is defined as “the flux per unit area measured at right angles to the direction of the electric flux”.

Title of the Practical: Calibrate given voltmeter/ammeter.

Q1 what is Voltmeter?
A1 A voltmeter is an instrument used for measuring the electrical potential difference between two points in an electric circuit.

Q2 what is analog voltmeter?
A2 Analog voltmeters move a pointer across a scale in proportion to the voltage of the circuit; General purpose analog voltmeters may have an accuracy of a few per cent of full scale, and are used with voltages from a fraction of a volt to several thousand volts. Digital voltmeters give a numerical display of voltage by use of an analog to digital converter.
Q3 what is moving coil galvanometer type voltmeter?
A3 A moving coil galvanometer can be used as a voltmeter by inserting a resistor in series with the instrument. It employs a small coil of fine wire suspended in a strong magnetic field. When an electrical current is applied, the galvanometer's indicator rotates and compresses a small spring. The angular rotation is proportional to the current through the coil. For use as a voltmeter, a series resistance is added so that the angular rotation becomes proportional to the applied voltage.
Q4 what is sensitivity of voltmeter?
A4 The sensitivity of such a meter can be expressed as "ohms per volt", the number of ohms resistance in the meter circuit divided by the full scale measured value. For example a meter with sensitivity of 1000 ohms per volt would draw 1 milliampere at full scale voltage.
Q5 what is the principle of voltmeter?
A5 Voltmeters operating on the electrostatic principle use the mutual repulsion between two charged plates to deflect a pointer attached to a spring. Meters of this type draw negligible current but are sensitive to voltages over about 100 volts and work with either alternating or direct current.
Q6 what are average reading AC voltmeters?
A6 Normally ac voltmeters are average responding type and the meter is calibrated in terms of the rms values for a sine wave. Since most of the voltage measurements involve sinusoidal waveform so this method of measuring rms value of ac voltages works satisfactorily and is less expensive than true rms responding voltmeters. However, in case of measurement of non-sinusoidal waveform voltage, this meter will give high or low reading depending on the form factor of the waveform of the voltage to be measured.
Q7 what is Ammeter?
A7 An ammeter is a measuring instrument used to measure the electric current in a circuit. Electric currents are measured in amperes (A), hence the name. Smaller values of current can be measured using a millimeter or a micrometer.
Q8 what is tangent galvanometer?
A8 The tangent galvanometer was used to measure currents using this effect, where the restoring force returning the pointer to the zero position was provided by the Earth's magnetic field. This made these instruments usable only when aligned with the Earth's field. Sensitivity of the instrument was increased by using additional turns of wire to multiply the effect - the instruments were called "multipliers".
Q9 what is D'Arsonval galvanometer?
A9The D'Arsonval galvanometer is a moving coil ammeter. It uses magnetic deflection, where current passing through a coil causes the coil to move in a magnetic field Moving iron ammeters use a piece of iron which moves when acted upon by the electromagnetic force of a fixed coil of wire. This type of meter responds to both direct and alternating currents (as opposed to the moving coil ammeter, which works on direct current only)

Q10 what is hot-wire ammeter?
A10 In a hot-wire ammeter, a current passes through a wire which expands as it heats. Although these instruments have slow response time and low accuracy, they were sometimes used in measuring radio-frequency current

Title of the Practical: Measure the electrical power and energy in a given circuit.

Q1 how can measure power in dc circuit?

A1 The result of this arrangement is that on a dc circuit, the deflection of the needle is proportional to both the current and the voltage, thus conforming to the equation P=VI

Q2 how can measure power in ac circuit?

A2 On an ac circuit the deflection is proportional to the average instantaneous product of voltage and current, thus measuring true power, and possibly (depending on load characteristics) showing a different reading to that obtained by simply multiplying the readings showing on a stand-alone voltmeter and a stand-alone ammeter in the same circuit.

Q3 why we use Electronic wattmeter?

A3 Circuits of a wattmeter can be damaged by excessive current. The ammeter and voltmeter are both vulnerable to overheating — in case of an overload, their pointers will be driven off scale. but in the Electronic wattmeter, either or even both the current and potential circuits can overheat without the pointer approaching the end of the scale! This is because Electronic wattmeter are used for direct, small power measurements or for power measurements at frequencies beyond the range of electrodynamometer-type instruments

Q4: What is power?

A4: Power is the amount of current times the voltage level at a given point measured in wattage or watts.

$$(P= V * I)$$

Q5: Hoe can measure the electrical energy?

A5: The measurement of the integral, with respect to time, of the power in an electric circuit. The absolute unit of measurement of electrical energy is the joule, or the charge in coulombs times the potential difference in volts. The joule, however, is too small (1 watt-second) for use in commercial practice, and the more commonly used unit is the watt-hour (3.6×10^3 joules).

Q6: What are the methods of measurement of energy?

A6: Electrical energy is one of the most accurately measured commodities sold to the general public. Many methods of measurement, with different degrees of accuracy, are possible. Basically, measurements of electric energy may be classified into two categories, direct-current power and alternating-current power. The fundamental concepts of measurement are, however, the same for both.

Q7: How can measure the energy in ac circuit?

A7: Measurement of energy on an alternating-current circuit by reading the watts input to the load at regular intervals over a measured period of time.

Q8: What is Electricity meters?

A8: Electricity meters are the most common devices for measuring the vast quantities of electrical energy used by industry and the general public. The same fundamentals of measurement apply as for electric power measurement, but in addition the electricity meter provides the time-integrating means necessary for electric energy measurement.

Q9: How can measure instantaneous electric power in an AC circuit?

A9: The instantaneous electric power in an AC circuit is given by P = VI, but these quantities are continuously varying. Almost always the desired power in an AC circuit is the average power, which is given by

$$P_{avg} = VI \cos\varphi$$

where φ is the phase angle between the current and the voltage and where V and I are understood to be the effective or rms values of the voltage and current. The term cos φ is called the "power factor" for the circuit.

Q10: What happened when Ac voltage applied to an Inductor?

A10: The alternating voltage V is expressed in term of $V = V_m \sin \omega t$. Applied voltage is varying with time according to sin ωt. Capacitor is the storing device of current and its unit is farad. Let we see about what will happen when the ac voltage applied to an inductor. Onside an ac source connected to an inductor. Assume that this inductor has negligible resistance because the inductor has small resistance in their winding. Therefore, it is a purely inductive ac circuit and the voltage across the source be $v = v_m \sin\omega t$.

Title of the Practical: Measure active & reactive power in 3-phase balance load circuit by one wattmeter method.

Q1: What is Wattmeter?

A1: The wattmeter is an instrument for measuring the electric power (or the supply rate of electrical energy) in watts of any given circuit.

Q2: What is analog wattmeter?

A2: The traditional analog wattmeter is an electrodynamics instrument. The device consists of a pair of fixed coils, known as current coils, and a movable coil known as the potential coil. The current coils connected in series with the circuit, while the potential coil is connected in parallel.

Q3: Operation of analog wattmeter?

A3: The potential coil carries a needle that moves over a scale to indicate the measurement. A current flowing through the current coil generates an electromagnetic field around the coil. The strength of this field is proportional to the line current and in phase with it. The potential coil has, as a general rule, a high-value resistor connected in series with it to reduce the current that flows through it.

Q4 what will be the power in three phase circuit?

A4 Total power in a 3f circuit is the sum of the powers of the separate phases. The total power could be measured by placing a wattmeter in each phase (Figure 12); however, this method is not feasible since it is often impossible to break into the phases of a delta load. It also may not be feasible for the Y load, since the neutral point to which the wattmeters must be connected is not always accessible. Normally, only two wattmeters are used in making 3f power measurements.

Q5 what do you mean by True power?

A5 It is the base or horizontal component of the power triangle which represent the actual or true power consumed in an AC circuit.

Q6 what are the features of three phase wattmeter?

A6

Measures 3 phase totals for Watts, VA VAr, Power factor (CosØ), RMS Voltage, amps and freq - for balanced loads

500Vrms, 10Arms Dc-100kHz (-3dB) autoranging protected inputs

Use for DC, single and three phase systems

Typical accuracy 0.5% reading + 2 digits 20Hz to 1kHz

Includes RS232 option includes PC_WATT Software for Windows

Isolated analog outputs for watts, voltage and current

Easy connection to load under test

Current probe input for external current probe / clamp current transformers

Low cos

Q7 what do you mean by Reactive power?

A7 It is the perpendicular or vertical component of the power triangle which represent reactive power of the circuit.

Q8 what do you mean by apparent power?

A8 It is the hypothetenus of power triangle. it is the power which looks to be consume in the circuit but actually it is not so.

Q9 what do you mean by power factor?

A9 It is the ratio of true power to the apparent power of an AC circuit.

Q10 what do you mean by polyphase system?

A10 An a.c. system having a group of equal voltages of same frequency arranged to have equal phase difference between them is called polyphase system.

Title of the Practical: Identify the different parts of 3-point starter and use it for starting single-phase induction motor

Q1 what do you mean by DC motor?
A1 A machine that converts DC electrical power into mechanical power is known as DC motor. Its working depends upon the basic principle that 'when a current carrying conductor is placed in the magnetic field, a force is exerted on it & torque develops'.

Q2 what do you mean by back EMF?
A2 when DC supply is given to the motor, armature rotates. The armature conductors cut across the main magnetic field and emf is induced in them in opposite direction to that of supply voltage called back emf.

Q3 what do you mean by three pole induction motor?
A3 A machine that converts 3 phase ac electrical power into mechanical power by using an electromagnetic induction phenomenon is called a 3 phase induction motor.

Q4 what are the types of induction motors?
A4 According o the construction of rotor there are two types of induction motors namely squirrel cage induction motor and phase wound induction motor.
Q5 what do you mean by a slip?
A5 the rotor never obtained the synchronous speed because at that speed there would be no relative speed between rotor conductors and stator revolving field and induction phenomenon is not possible. Its speed is always less than synchronous speed.

Q6 what do you mean by single phase induction motor?
A6 A machine that converts 1 phase ac electrical power into mechanical power by using a electromagnetic induction phenomenon is called a 1 phase induction motor.

Q7 what do you mean by split phase motor?
A7 To obtain starting torque I 1 phase induction motors, the single winding is splitted into resultant field revolving in space at synchronous speed.

Q 8 what do you mean by shaded pole motor?
A8 these motor have projected pole with 1/3 pole part rapped with a copper strip. This portion of the pole is called shaped part of the pole because of this a revolving field is set up in the Stator and torque is developed.

Q9 what do you mean by synchronous motor?
A9 the machine that converts ac. Electrical power into mechanical power and is operated only at a synchronous speed is known as synchronous motor.

Q10 what is the function of an alternator?
A10 the machine that converts mechanical power into a.c. electrical power at a desired frequency is called a synchronous motor.

Title of the Practical: Identify various types of induction motor looking at the constructional details.

Q1 what are the main parts of a D.C. machine?
A1 The main parts a DC machine is:

1. Magnetic frame or yoke
2. pole core and pole shoes
3. field exciting coils
4. armature coils
5. Armature windings
6. commutator
7. brushes
8. End housing Bearing

Q2 what do you mean by a D C machine?
A2 A D C machine is an electro-mechanical energy conversion device. It can convert mechanical power into D C electrical power & vice versa.

Q3 what do you mean by D C generator?
A3 A machine which converts a mechanical power into DC electrical power is called DC generator. It works on the principle of electro magnetic induction.

Q4 what is the function of Commutator?
A4 The Commutator converts the alternating current produced in the armature into direct current in the external load circuit.
Q5 what are types of DC generators?
A5 there are mainly two types of DC generator:

1. Separately exited DC generator
2. self exited DC generators
3.

Q6 what do you mean by separately exited dc generators?
A6 A dc generators whose field winding is supplied current from an external dc source is called a separately exited dc generator.

Q7 what do you mean by self exited dc generator?
A7 A dc generator whose field windings are supplied current by the generator itself is called a self exited dc generator.

Q8 what do mean by an electrical instrument?
A8 The instruments which are used to measure electrical quantities are called electrical quantity are electrical instruments.

Q9 what do you mean by a magneto motive force?
A9 The magnet pressure which setup in a magnetic circuit is called magneto motive force.

Q10 what do you mean by electromagnetic induction?
A10 The phenomenon by which an e.m.f. is induced in a circuit when magnetic flux linking with it changes is called electromagnetic induction.

Title of the Practical: Use analog and digital multimeter for testing voltage, current and resistance

Q1 why we use digital meter?
A1 Digital meters can be made with high accuracy, typically better than 1%. Specially calibrated test instruments have higher accuracies, with laboratory instruments capable of measuring to accuracies of a few parts per million
Q2 what is Digital ammeter?
A2 Digital ammeter designs use an analog to digital converter (ADC) to measure the voltage across the shunt resistor; the digital display is calibrated to read the current through the shunt.
Q3 what is AC/DC ammeter?
A3 Accurate AC/DC non-contact ammeters have been constructed using Hall effect magnetic Field sensors. A portable hand-held clamp-on ammeter is a common tool for maintenance of industrial and commercial electrical equipment, which is temporarily clipped over a wire to measure current
Q4 How to measure large current?
A4 To measure larger currents, a resistor called a shunt is placed in parallel with the meter. Most of the current flows through the shunt, and only a small fraction flow through the meter. This allows the meter to measure large currents
Q5 what are Zero-center ammeters?
A5 Zero-center ammeters are used for applications requiring current to be measured with both polarities, common in scientific and industrial equipment Zero-center ammeters are also commonly placed in series with a battery. In this application, the charging of the battery deflects the needle to one side of the scale (commonly, the right side) and the discharging of the battery deflects the needle to the other side.
Q6 what is current?
A6 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 conductors of a circuit is called a current, and it is often referred to in terms of "flow," just like the flow of a liquid through a hollow pipe. Current is measured in amperes (A).
Q7 what is voltage?
A7 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. When we speak of a certain amount of voltage being present in a circuit, we are referring to the measurement of how much potential energy exists to move electrons from one particular point in that circuit to another particular point.
Q8 what is resistance?
A8 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. The amount of current in a circuit depends on the amount of voltage available to motivate the electrons, and also the amount of resistance in the circuit to oppose electron flow. For this reason, the quantities of voltage and resistance are often stated as being "between" or "across" two points in a circuit. A very high resistance allows a small amount of current to flow. A very low resistance allows a large amount of current to flow. Resistance is measured in ohms (Ω).

Q9 how can measure the energy in ac circuit?
A9 Measurement of energy on an alternating-current circuit by reading the watts input to the load at regular intervals over a measured period of time.

Q10 what is Electricity meters?
A10 Electricity meters are the most common devices for measuring the vast quantities of electrical energy used by industry and the general public. The same fundamentals of measurement apply as for electric power measurement, but in addition the electricity meter provides the time-integrating means necessary for electric energy measurement.

Title of the Practical: Use rheostat as Regulator and Potential divider.

Q1 what do you mean by an electric field?
A1 Electric field is the region or space surrounding an electric charge in which the effect of charge is readily experienced.

Q2 Explain electric flux?
A2 Electric flux is total number of lines of force in any particular field. Their unit is coulomb.

Q3 Explain electric flux Density?
A3 Electric flux density is defined as "the flux per unit area measured at right angles to the direction of the electric flux".

Q4 Explain electric field strength?
A4 Electric field strength at any point is define as the mechanical force experienced by a unit positive charge placed at that point in the electric field.

Q5 define resistivity?
A5 The resistance offered by one meter length of wire having an area of cross section of one square meter is called the resistivity of material.

Q6 Define conductance?
A6 the ease to the flow of current is called conductance.

Q7 what do you mean by a Conductivity?
A7 Conductivity is basically the property or nature of the material due to which it allows the current to flow through it.

Q8 what is regulated power supply?
A8 A regulated power supply is an embedded circuit, or stand alone unit, the function of which is to supply a stable voltage (or less often current), to a circuit or device that must be operated within certain power supply limits. The output from the regulated power supply may be alternating or unidirectional, but is nearly always DC (Direct Current).
Q9 Types of voltage regulator?
A9 The type of stabilization used may be restricted to ensuring that the output remains within certain limits under various load conditions, or it may also include compensation for variations in the efficiency of Zener regulated power supply becomes very low when the load current is high. Under such conditions a Zener controlled transistor is always used for maintaining output voltage constant. Basically there are two types of Zener controlled transistor voltage regulators. They are 1) Series Voltage Regulators, 2) Shunt Voltage Regulators.
Q10 Zener diode as voltage regulator?
A10 Zener diodes are widely used as voltage references and as shunt regulators to regulate the voltage across small circuits. When connected in parallel with a variable voltage source so that it is reverse biased, a Zener diode conducts when the voltage reaches the diode's reverse breakdown voltage. The intrinsic voltage drop of diode is stable over a wide current range and holds output voltage relatively constant even though the input voltage may fluctuate over a fairly wide range. Resistor R is used to limit current through the circuit.

Title of the Practical: measurement of voltage, current and resistance using LCR meter.

Q1 what is LCR meter?
A1 LCR meter (Inductance (L), Capacitance (C), and Resistance (R)) is a piece of electronic test equipment used to measure the inductance, capacitance and, resistance) of a component.

Q2 what do you mean by an active element?
A2 the element which supplies energy to the circuit is called active element.

Q3 what do you mean by a passive element?
A3 the element which receives energy from the circuit is called passive element.

Q4 what do you mean by an inductance?
A4 Inductance is the property of a material by virtue of which it opposes any change of magnitude or direction of electric current passing through the conductor. The unit of inductance being Henry (H).

Q5 what do you mean by a conductance?
A5 It is the capability of of elements to store electric charge within it. A capacitor stores electric energy in the form of electric field being established by the two polarities of charges on the two electrodes of a capacitor.

Q6 what do you mean by a voltage source?
A6 A voltage source is a two terminal device whose voltage at any instant of time is independent of the current flowing through its terminals.

Q7 what do you mean by a current source?
A7 An independent ideal current source is a 2 terminal circuit element that will supply the same current to any load resistance connected across its terminals.

Q8 what do you mean by an electromagnet?
A8 A magnetic material when obtain the magnetic property by providing a current carrying solenoid around it is called an electromagnet.

Q9 what do you mean by a magnetic flux?
A9 The amount of magnetic lines of force setup in a magnetic circuit is called magnetic flux.

Q10 what do you mean by a magneto motive force?
A10 The magnet pressure which setup in a magnetic circuit is called magneto motive force.

Title of the Practical: Calculate fusing current of a fuse wire.

Q1 what is fuse?
A1 a **fuse** is a type of sacrificial over current protection device. Its essential component is a metal wire or strip that melts when too much current flows, which interrupts the circuit in which it is connected. Short circuit, overload or device failure is often the reason for excessive current.

Q2 what are the materials used for the fuse?
A2 Fuse bodies may be made of ceramic, glass, plastic, fiberglass, molded mica laminates, or molded compressed fiber depending on application and voltage class.

Q3 what is the breaking capacity of the fuse?
A3 The breaking capacity is the maximum current that can safely be interrupted by the fuse. Generally, this should be higher than the prospective.

Q4 what do you mean by shunt?
A4 Shunt is just a resistor having very low value of resistance.

Q5 what do you mean by electromagnetic induction?
A5 The phenomenon by which an e.m.f. is induced in a circuit when magnetic flux linking with it changes is called electromagnetic induction.

Q6 what do you mean by self induced e.m.f.?
A6 The e.m.f. induced in a coil due to the change of the flux produced by it linking with it's own terms is called self induced e.m.f.

Q7 what do you mean by mutually induced e.m.f.?
A7 The e.m.f. induced in a coil due to the change of flux produced by another coil linking with it is called mutually induced e.m.f.

Q8 what do you mean by self inductance?
A8 The property of a coil due to which it oppose the change of current flowing through itself is called self inductance of the coil.

Q9 what do you mean by mutual inductance?
A9 The property of a coil due to which it opposes the change of current in the other coil is called mutual inductance between the two coils.

Q10 what do you mean by magnetic hysteresis?
A10 The phenomenon of flux density B lagging behind the magnetizing force H in a magnetic material is called magnetic hysteresis.

Title of the Practical: Identify the different parts of a dismantled motor.

Q1 what do you mean by DC motor?
A1 A machine that converts DC electrical power into mechanical power is known as DC motor. Its working depends upon the basic principle that 'when a current carrying conductor is placed in the magnetic field, a force is exerted on it & torque develops'.

Q2 what do you mean by back EMF?
A2 when DC supply is given to the motor, armature rotates. the armature conductors cut across the main magnetic field and emf is induced in them in opposite direction to that of supply voltage called back emf.

Q3 what do you mean by three pole induction motor?
A3 A machine that converts 3 phase ac electrical power into mechanical power by using an electromagnetic induction phenomenon is called a 3 phase induction motor.

Q4 what are the types of induction motors?
A4 According o the construction of rotor there are two types of induction motors namely squirrel cage induction motor and phase wound induction motor.

Q5 what do you mean by a slip?
A5 the rotor never obtained the synchronous speed because at that speed there would be no relative speed between rotor conductors and stator revolving field and induction phenomenon is not possible. Its speed is always less than synchronous speed.

Q6 what do you mean by single phase induction motor?
A6 A machine that converts 1 phase ac electrical power into mechanical power by using a electromagnetic induction phenomenon is called a 1 phase induction motor.

Q7 what do you mean by split phase motor?
A7 To obtain starting torque I 1 phase induction motors, the single winding is splitted into resultant field revolving in space at synchronous speed.

Q 8 what do you mean by shaded pole motor?
A8 these motor have projected pole with 1/3 pole part rapped with a copper strip. This portion of the pole is called shaped part of the pole because of this a revolving field is set up in the Stator and torque is developed.
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