Question Bank – Electrician Technology

Table of Contents

Question Bank – Electrician Technology

T.T.P. Series No. 46

DEVELOPMENT CELL
FOR SKILLED LABOUR TRAINING
DIRECTORATE OF MANPOWER & TRAINING
GOVERNMENT OF THE PUNJAB
LAHORE

This Question Bank with its sections

MATERIALS, BENCHWORK, MACHINE TOOLS GENERAL, MACHINE ELEMENTS, BRAZING and WELDING, HEAT TREATMENT, THREADS, TURNING, MILLING, SHAPING and PLANING, DRILLING and REAMING, GRINDING, MEASURING and CHECKING

covers all main aspects of technology relevant for trainees in the metal trades.

It provides a multitude of questions to the Trade Testing Authorities and to teachers and instructors in Training Centres and undertakings and thus to a great extent relieves them of the time consuming work of again and again finding and compiling new questions for intermediate and final tests.

Throughout this Question Bank multiple–choice questions have been used, as only this type of questioning allows for a high degree of objectivity and for a time saving method of checking. Of great importance for the assessment is *the* fact that only one of the given answers is correct.

For teachers and instructors a main advantage of this Question Bank is that not only can tests be set up in a very short time but that they can also be carried out within minutes (e.g. an intermediate test with 15 different questions on a special topic can be conducted within 20–30 minutes).

Thus it is much easier for the teacher to permanently – maintain a clear picture of the knowledge of his students. The student himself is able to check his knowledge regularly and the whole series of questions may help him in preparing for the final test as well.

DO NOT WRITE ON THE QUESTION SHEETS!
ALWAYS USE A SEPARATE MARKING SHEET!

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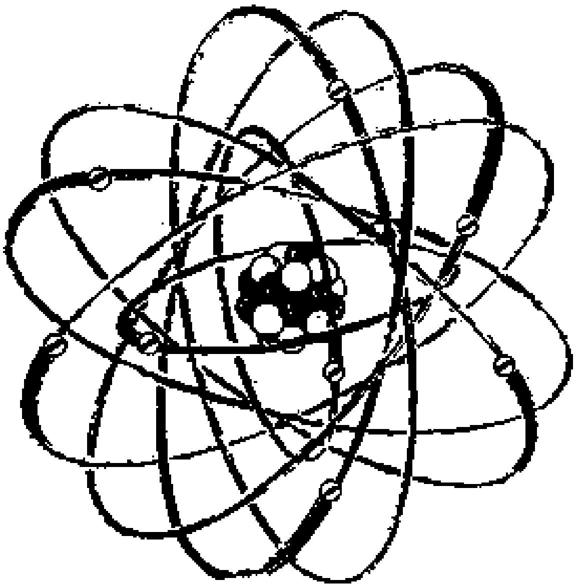
DC−Circuit

DC 1.1 The figure shown represents Bohr's model of the oxygen atom. Which particles constitute the nucleus and which revolve around it?



1. In nucleus: protons; around the nucleus: electrons.
2. In nucleus: protons; around the nucleus: neutrons.
3. In nucleus: ions; around the nucleus: electrons.
4. In nucleus: neutrons; around the nucleus: electrons.
5. In nucleus: protons; around the nucleus: ions.

DC 1.2 Which of the statements is true about the charge of the elementary particles, protons and electrons?

1. The proton is neutral, the electron carries a positive charge.
2. The proton carries a negative charge, the electron carries a positive charge.
3. The proton carries a negative charge, the electron is neutral.
4. The proton carries a positive charge, the electron carries a negative charge.
5. The proton carries a positive charge, the electron carries a positive charge.

DC 1.3 Which of the statements about the force between two charges is true?

1. Unlike charges repel each other.
2. Like charges attract each other.
3. No force exists between two like charges..
4. No force exists between two unlike charges.
5. A force of repulsion exists between two like charges.

DC 2.1 The electrons revolve around the nucleus with high velocity. Which type of force acts against the centrifugal force and keeps the electrons in their orbits?

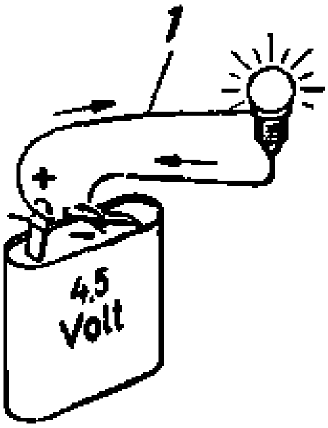
1. Electrostatic force of attraction
2. Electromagnetic force of attraction
3. Gravitational force
4. Adhesive force
5. Cohesive force

DC 2.2 What is the difference between an atom and an ion?

1. Ions have always a larger mass than the atoms of the same element.
2. Ions are neutral particles while atoms always carry a positive charge.
3. Ions are always charged particles while the atoms are neutral as a whole.
4. Ions can only exist in liquid solutions.

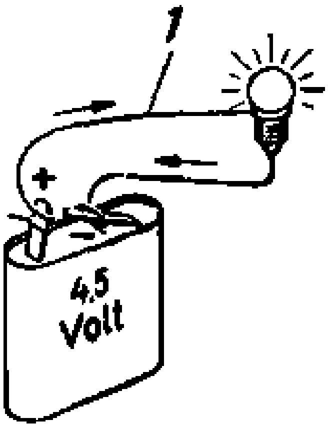
5. Ions have always a smaller mass than the atoms of the same element.

DC 2.3 Which of the following statements is true about the conductor position marked 1?



1. This point of the conductor has a definite potential against earth.
2. This point of the conductor has a definite voltage.
3. A current flows through the conductor.
4. Protons flow through the conductor.
5. Ions flow through the conductor.

DC 3.1 In the figure" shown the current flows through the metallic conductor marked 1. Which of the statements is true about this current?



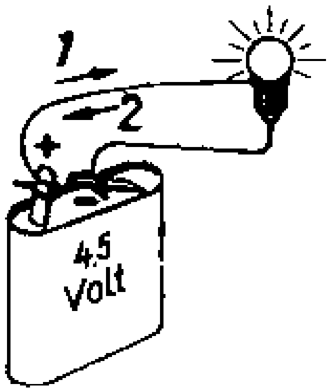
It is

1. a directed movement of positrons.
2. an irregular movement of ions.
3. a directed movement of ions.
4. an irregular movement of electrons.
5. a directed movement of electrons.

DC 3.2 Which particles act as a current carrier in a metallic conductor?

1. Only electrons
2. Only ions
3. Electrons and defect electrons
4. Electrons and ions
5. Ions and defect electrons

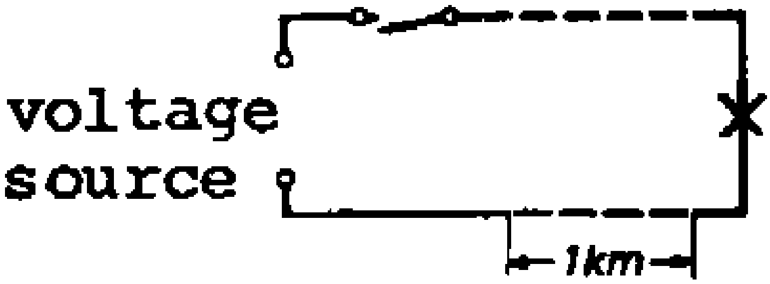
DC 3.3 In electrical engineering one talks about the conventional direction of current and the direction of electron flow. In the figure shown



1. arrow 1 shows the conventional direction of current as well as the direction of electron flow.
2. arrow 2 shows the conventional direction of current as well as the direction of electron flow.
3. arrow 1 shows the conventional direction of current and arrow 2 the direction of electron flow.
4. arrow 1 shows the direction of electron flow and arrow 2 the conventional direction of current.
5. both the arrows show the conventional direction of current because it is an alternating current.

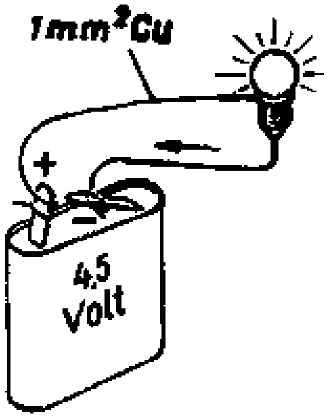
DC 4.1 The lamp shown in the picture is switched on.

From the moment of switching on how long does it take for the lamp to glow?



1. 3 seconds because the current travels at the velocity of sound.
2. About 1 second.
3. About 0.1 second.
4. About 0.01 second.
5. The time is practically zero because the velocity of propagation of current is almost that of light.

DC 4.2 Electrons flow through the metallic conductor shown in the figure. What is the approximate velocity of these electrons?



1. Approximately equal to the velocity of light.
2. Approximately 2/3 of the velocity of light.
3. Approximately equal to the velocity of sound.
4. Approximately the velocity of 100 m/s.
5. Approximately the velocity of 1 mm/s.

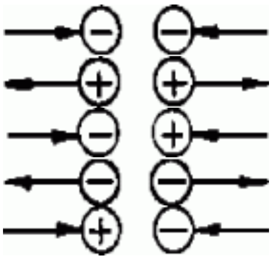
DC 4.3 If an atom looses one or more electrons it becomes

1. electrically neutral.
2. electrically positive.
3. electrically negative.
4. a neutral ion.
5. a negative ion.

DC 4.4 What is an electric current?

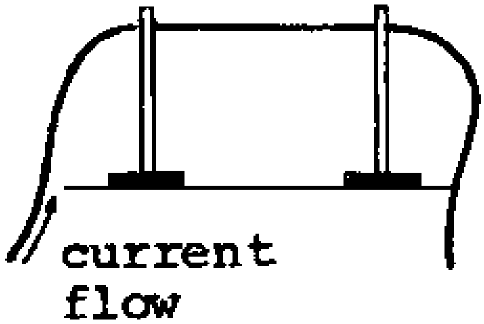
1. The power that moves the electrons.
2. The random movement of electrons in a conductor.
3. The pressure difference between two poles.
4. The movement of free electrons predominantly in one direction
5. The flow of neutrons from left to right.

DC 5.1 Which of the following pairs of arrows show the wrong direction of the forces between the charges?



1.
2.
3.
4.
5.

DC 5.2 An electric current flows through the conductor shown in the figure. What are the effects of the current passing through. it?



1. Magnetic effect and heating effect.
2. Only chemical effect.
3. Only magnetic effect.
4. Only heating effect.
5. Magnetic or heating effect, depending upon the current strength.

DC 5.3 What are the minimum requirements to cause the flow of current?

1. A voltage source and a conductor.
2. A voltage source, a conductor and an insulator.
3. A voltage source, a switch and a resistor.
4. A voltage source, an ammeter, a conductor and an insulator.
5. A conductor, an insulator and a resistor.

DC 5.4 What is the unit and symbol of current?

1. Unit: Ampere (A); symbol: I
2. Unit: Ampere (A); symbol: V
3. Unit: Ampere (A); symbol: R
4. Unit: Volt (V); symbol: V
5. Unit: Volt (V); symbol: I

DC 6.1 Which of the following statements about the heating effect of current is true?

1. The heating effect appears only with large currents.
2. The higher the current strength, the lower the heating effect.
3. The heating effect is always desirable.
4. The heating effect is always undesirable.
5. The heating effect always appears when a current flows through a resistor.

DC 6.2 In which of the following appliances is the heating effect used?

1. Electric motor
2. Transformer
3. Electric furnace
4. Generator
5. Choking coil

DC 6.3 In which of the following appliances does the heating effect of current appear as an undesirable side effect?

1. Immersion heater
2. Electric iron
3. Vacuum cleaner
4. Electric oven
5. Electric boiler

DC 6.4 Which effect of the electric current is utilized in a filament lamp?

1. The heating effect.
2. The magnetic effect.
3. The collision ionization of the gases.
4. The chemical effect.
5. The physiological effect.

DC 7.1 What is the principle of fluorescent lamps?

1. Same as of filament lamps, however, instead of the metallic wire, fluorescent material is heated.

2. Same as of filament lamps, however, instead of the metallic filament, gas filling is heated to a high temperature.

3. The collisions of ions and electrons cause the orbital jumps of electrons, which produces light.

4. The atoms of the gas filling are stimulated to swing under the influence of alternating current and thus light is produced.

5. Fluorescent lamps have a high vacuum. When the electrons fly through this vacuum light is produced.

DC 7.2 What other effect of the electric current is also present in the fluorescent lamp and causes losses in the efficiency of the lamp?

1. The chemical effect.
2. The heating effect.
3. The magnetic effect.
4. The chemical and the magnetic effect.
5. The physiological effect.

DC 7.3 Does the electric current always produce a magnetic field?

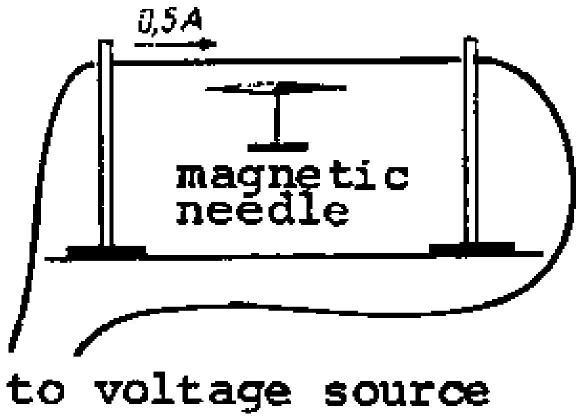
1. No, only large currents produce a magnetic field.
2. No, a magnetic field is produced only in the presence of an iron core.
3. No, a magnetic field is produced only in the presence of a coil.
4. Yes, the electric current always produces a magnetic field.

5. No, in case of a supra conductor no magnetic field is produced.

DC 7.4 Which of the following currents is considered dangerous to the human body?

1. 1 ?A
2. 1 mA
3. 30 mA
4. 50 mA
5. 0.5 A

DC 8.1 When the conductor shown in the diagram is connected to a battery, a current of 0.5 ampere flows through it in the shown direction. What is the effect on the magnetic needle?



1. The needle is not deflected, because a magnetic field is only produced by a coil.

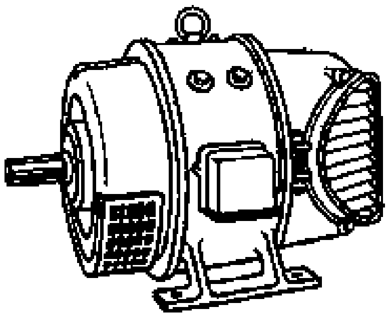
2. The needle is not deflected, because only large currents produce a magnetic field.

3. The needle is not deflected, because a direct current does not produce a magnetic field.

4. The needle is not deflected, because the presence of a magnetic field cannot be indicated by the magnetic needle.

5. The needle is deflected, because every current carrying conductor is associated with a magnetic field.

DC 8.2 Which of the effects of the electric current appear in the motor shown in the figure?



1. Only the magnetic effect.
2. The magnetic effect and the heating effect.
3. Only the heating effect.
4. The heating effect and the chemical effect.
5. Only the chemical effect.

DC 8.3 In which of the following components is the chemical effect of significance?

1. Metallic paper capacitor
2. Lead acid battery
3. Selenium rectifier

4. Silicon rectifier
5. Photo element

DC 9.1 Which of the following processes is based upon the chemical effect of electric current?

1. Soft soldering with solder iron
2. Hard soldering with a flame
3. Electroplating
4. Electric welding
5. Tinning of copper in melted tin bath

DC 9.2 Why is it especially dangerous to touch electric appliances with wet hands?

1. Because the water decomposes and the hand receives a shock.

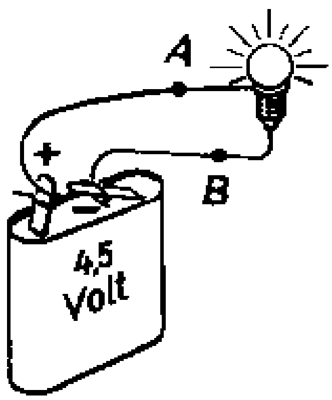
2. Because due to the presence of water one does not feel the shock at the first moment and when it is felt, it is too late.

3. Because the transition resistance to the body reduces considerably.

4. Because the water evaporates and the hands burn.

5. Because the water dissolves the insulating fat layer which increases the transition resistance.

DC 9.3 Which of the electrical quantities can be measured between points A and B?



1. Electric current
2. Electric work
3. Electric voltage
4. Electric power
5. Electric energy

DC 9.4 In which of the following voltage sources is the voltage produced by chemical transformation?

1. In a D.C. generator
2. In a three phase alternator
3. In a transformer
4. In a photoelement
5. In a zinc carbon element

DC 10.1 What do you understand by electromotive force?

1. The torque produced by a motor.
2. The force experienced by an electromagnet.
3. The force with which the current carrying conductors attract or repel each other.
4. The voltage produced in a voltage source.
5. The force with which positive and negative charges. attract each other.

DC 10.2 Which of the following statements about electric voltage is true?

1. Voltage is the directed movement of electrons.
2. Voltage causes current to flow.
3. Voltage is the irregular movement of electrons.
4. Voltage is not always needed to cause the flow of current.
5. Without voltage there is no electrical resistance.

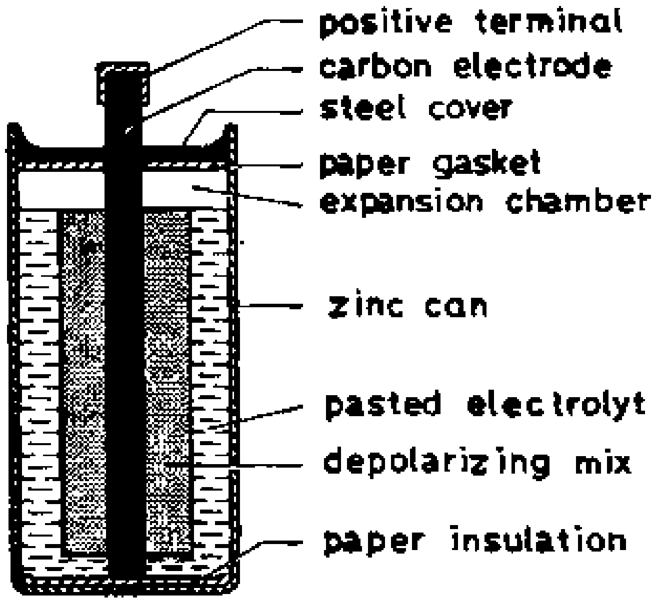
DC 10.3 Which is the unit and symbol for voltage?

1. Unit: Volt (V); symbol: V
2. Unit: Volt (V); symbol: I
3. Unit: Watt (W); symbol: V
4. Unit: Ampere (A); symbol: I
5. Unit: Ampere (A); symbol: V

DC 10.4 In which of the following voltage sources is the movement of conductors in a magnetic field used to produce voltage?

1. In a thermo couple
2. In a zinc copper element
3. In a D.C. generator
4. In a transformer
5. In a photoelement

DC 11.1 What is the name of the cell shown in the figure?



1. Zinc−brass cell
2. Zinc−carbon cell
3. Depolarization cell
4. Zinc−electrolite cell
5. Carbon−electrolite cell

DC 11.2 What voltage is supplied by the cell shown in the above figure?

1. approx. 0.5 V
2. approx. 1.11 V
3. approx. 1.5 V
4. approx. 1.74 V
5. approx. 2 V

DC 11.3 What voltage is supplied by one cell of a lead acid battery?

1. approx. 0.8 V
2. approx. 1.2 V
3. approx. 1.6 V
4. approx. 2 V
5. approx. 2.8 V

DC 11.4 Which of the following statements is correct?

1. The resistance of a wire does not depend upon its material.

2. The resistance of a conductor is the hindrance by which the conductor opposes the flow of the current.

3. The resistance of most of the materials is independent of the temperature.

4. The resistance does not play an important role in electrical engineering.

5. The resistance of a conductor is dependent upon the voltage applied.

DC 12.1 Which is the unit and symbol for resistance?

1. Unit: Ampere (A); symbol: I
2. Unit: Ohm (?); symbol: R
3. Unit: Ohm (?); symbol: V
4. Unit: Ohm (?); symbol: I
5. Unit: Volt (?); symbol: V

DC 12.2 What do you understand by specific resistance ??

1. Resistance of a conductor which has a length of 1 m and a cross−section of 1 mm^2 at 20°C.
2. Resistance of any conductor at 20°C.
3. Resistance of any conductor at 25°C.
4. Resistance of a conductor which has a length of 1 m and a cross−section of 1 cm^2 at 20°C.
5. Resistance of a conductor which has a length of 1 TO and a cross−section of 1 cm^2 at 25°C.

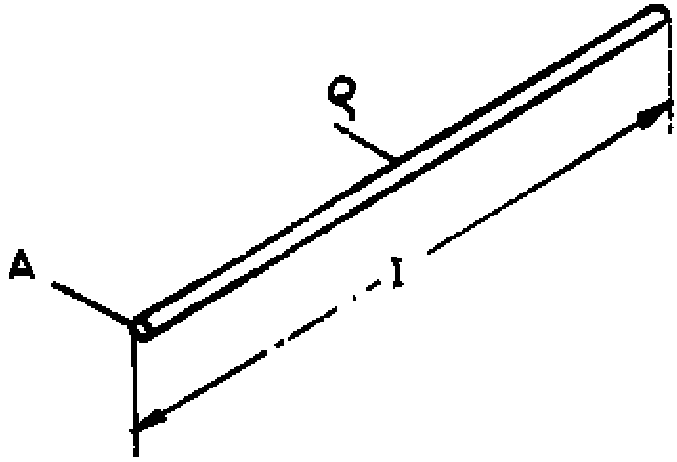
DC 12.3 Upon which factors does the specific resistance depend? It depends upon

1. the material of the conductor, its area of cross−section and length.
2. the area of cross−section and the length of the conductor.
3. the area of cross−section of the conductor only.
4. the length of the conductor only.
5. the nature of the material of the conductor only

DC 12.4 Which of the following statements is true?

1. The longer the conductor, the greater its resistance.
2. The shorter the conductor, the greater its resistance.
3. The less the specific resistance, the greater the resistance.
4. The higher the conductivity, the greater the resistance.
5. The larger the area of cross−section, the greater the resistance.

DC 13.1 With which of the following formulae can the resistance of the conductor shown in the figure be calculated?



A = cross–section area
? = specific resistance
l = length of conductor

1. $R = \frac{\rho \times l}{A}$
2. $R = \rho \times l \times A$
3. $R = \frac{\rho \times A}{l}$
4. $R = \frac{l}{\rho \times A}$
5. $R = \frac{A}{\rho \times l}$

DC 13.2 How does the resistance of unalloyed metals change with the change in temperature?

1. The resistance decreases with increasing temperature.

2. The resistance does not change.

3. The resistance increases with decreasing temperature.

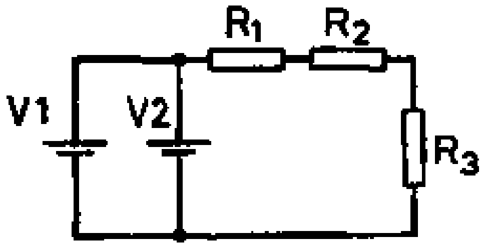
4. The resistance changes only in case of very high temperature variations which do not occur in practice.

5. The resistance increases with Increasing temperature.

DC 13.3 How can the resistance R_{hs} of a conductor at temperature T be calculated when the conductor at 20°C has the resistance R_{CS} and the temperature coefficient is known?

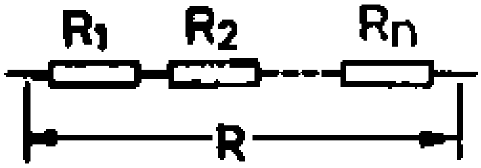
1. R_{hs} = R_{CS} × ? × T
2. R_{hs} = R_{CS} × ? × ?T
3. R_{hs} = R_{CS} + ? × ?T
4. R_{hs}= R_{CS} x (1 + ? × T)
5. R_{CS} = R_{CS} + R_{CS} × ? × ?T

DC 14.1 Which of the statements about the circuit shown in the figure is true?



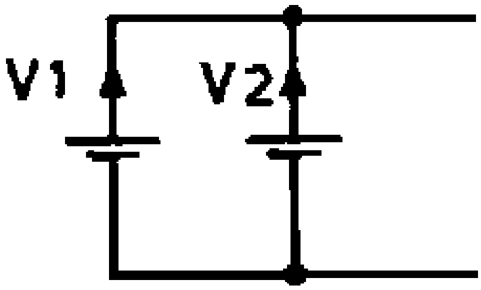
1. The voltage sources V1 and V2 are connected in series.
2. The resistances R1 and R2 are connected in parallel.
3. The voltage sources V1 and V2 are connected in parallel.
4. The resistances R1, R2 and R3 are connected in, parallel.
5. The resistance R3 is connected in parallel with the voltage sources V1 and V2.

DC 14.2 Which of the following formulae to calculate the total resistance R of the shown circuit is correct?



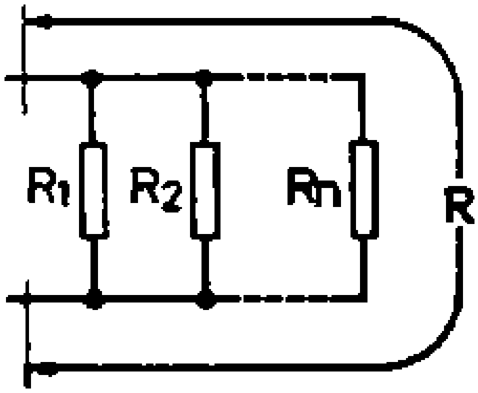
1. $R = \frac{1}{R_1} + \frac{1}{R_2} + ... \frac{1}{R_n}$
2. $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + ... \frac{1}{R_n}$
3. $\frac{1}{R} = R_1 + R_2 + ...R_n$
4. $R = R_1 + R_2 + ...R_n$
5. $R = \frac{R_1 \times R_2 \times .....R_n}{R_1 + R_2 + ...R_n}$

DC 14.3 Two voltage sources of 12 V, each of which can be loaded up to 10 A, are connected in parallel. Which of the following statements about the circuit is true?



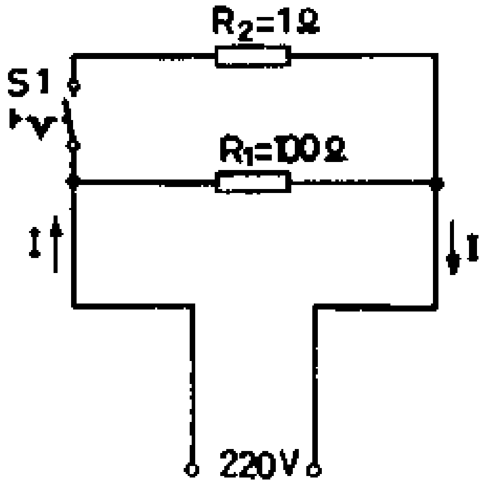
1. The total voltage is 24 V.
2. The total voltage is zero.
3. The arrangement can be loaded up to 10 A maximum.
4. The circuit can supply a maximum current of 5 A.
5. The voltage sources connected in parallel can supply a maximum current of 20 A.

DC 15.1 Which of the following formulae to calculate the total resistance R of the shown circuit is correct?



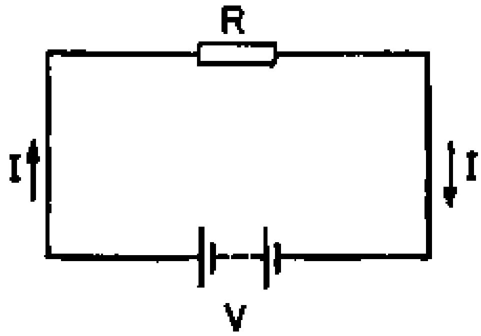
1. $R = \frac{R_1 \times R_2 \times .....R_n}{R_1 + R_2 + ...R_n}$
2. $R = \frac{1}{R_1} + \frac{1}{R_2} + ...\frac{1}{R_n}$
3. $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + ...\frac{1}{R_n}$
4. $R = R_1 + R_2 + ...R_n$
5. $\frac{1}{R} = R_1 + R_2 + ...R_n$

DC 15.2 The switch shown in the circuit is open. A current I is drawn by the circuit from the voltage source. When the switch is closed, the current will



1. not change its value.
2. become slightly larger.
3. become considerably larger.
4. become slightly smaller.
5. become considerably smaller.

DC 15.3 The current in the shown circuit increases when



1. the consumer resistance increases.
2. a voltage source with higher voltage is used.
3. the length of the conductor is increased.
4. the temperature of the consumer resistance is increased.
5. instead of the copper conductor an aluminium conductor is used.

DC 16.1 What is the formula for Ohm's law?

1. $V = I + R$
2. $I = V \times R$
3. $V = \frac{I}{R}$
4. $I = \frac{R}{V}$
5. $I = \frac{V}{R}$

DC 16.2 What do you understand by the term 'voltage drop'?

1. The voltage across a resistance.
2. The voltage which is wasted in the earth connection.
3. The voltage which is wasted in a short−circuit.
4. The voltage loss as a result of insulation damage.
5. The part of voltage in the human body when the current carrying conductor is touched.

DC 16.3 Upon which of the factors does the voltage drop depend?

1. Only upon the resistance of the conductor.
2. Only upon the length and the specific resistance of the conductor.
3. Upon the cross−section area and the conductivity of the conductor.
4. Upon the resistance of the conductor and the current flowing through it.
5. Only upon the conductivity of the conductor.

DC 16.4 Which of the following formulae gives the terminal voltage V of a voltage source whose e.m.f. E, the internal resistance R_i and the current drawn I are known?

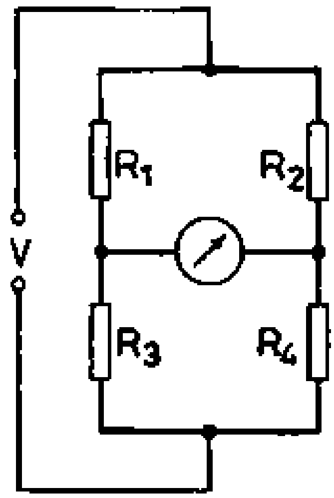
1. $V = E + I \times R_i$
2. $V = E$
3. $V = 0.9\ E$
4. $V = E - I \times R_i$
5. $V = 1.1 \times E$

DC 17.1 What is the maximum current I_{sc} (short−circuit current) which can be supplied by a voltage source of e.m.f. E and internal resistance R_i?

1. $I_{sc} = 0$
2. $I_{sc} = ?$

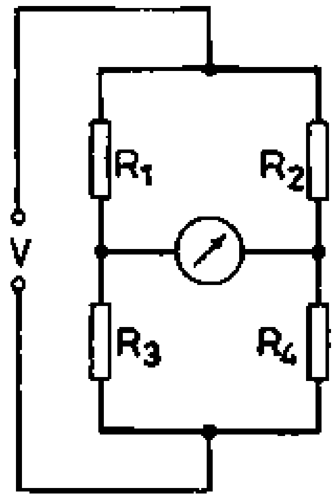
3. $I_{sc} = \frac{E}{R_i}$
4. $I_{sc} = E \times R_i$
5. The short–circuit current I_{sc} cannot be calculated by the given values.

DC 17.2 What does the shown circuit represent?



1. A quadrangle circuit.
2. A transverse circuit.
3. A bridge circuit.
4. A transverse resistance circuit.
5. A voltage divider circuit.

DC 17.3 Which of the following conditions must be fulfilled in order that no current flows through the instrument?



1. $\frac{R_1}{R_3} = \frac{R_2}{R_4}$
2. $R_1 \times R_3 = R_2 \times R_4$
3. $\frac{R_1}{R_4} = \frac{R_2}{R_3}$
4. $R_1 + R_3 = R_2 + R_4$
5. $R_1 + R_2 = R_3 + R_4$

DC 18.1 Which of the following formulae is true for the calculation of the electrical work W when voltage V, current I and time t are known?

1. $W = V \times I$
2. $W = V \times I \times t$
3. $W = \frac{V \times I}{t}$
4. $W = \frac{V \times t}{I}$
5. $W = \frac{I \times t}{V}$

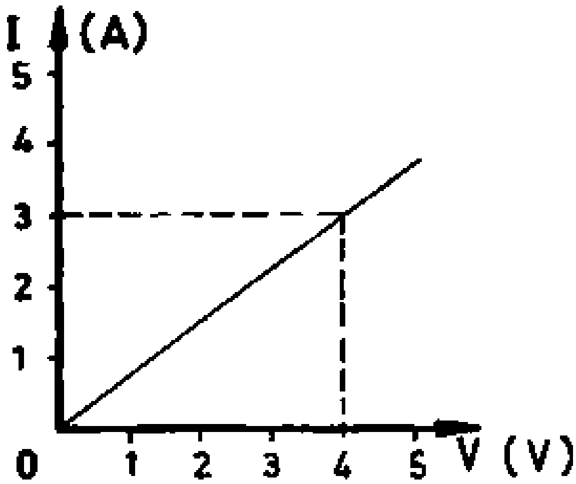
DC 18.2 Which of the following formulae is correct for the calculation of electrical energy consumed by an appliance when the voltage V, the time t and the power P are known?

1. $W = \frac{P \times V}{t}$
2. $W = P \times t$
3. $W = \frac{P \times t}{V}$
4. $W = \frac{P}{t}$
5. $W = \frac{V \times t}{P}$

DC 18.3 Which of the following statements about energy is true?

1. Energy can be created without any basic source.
2. Energy can be destroyed.
3. Work and energy are physical quantities having no relation to each other.
4. Energy is another name for power.
5. Energy can neither be created nor destroyed.

DC 18.4 To which resistance does the following diagram belong?



1. 0.5 ohms
2. 0.67 ohms
3. 0.75 ohms
4. 1.3 ohms
5. 2.5 ohms

DC 19.1 If in a circuit the voltage is doubled and the resistance is cut in half at the same time, the current will be

1. doubled.
2. a quarter.
3. a half.
4. the same.
5. four times as high.

DC 19.2 The resistance of a wire will double if we double its

1. area.
2. temperature.
3. length.
4. weight.
5. volume.

DC 19.3 Which of the following wires has the highest resistance?

1. Copper wire of 5 m and 2 mm^2
2. Copper wire of 1 m and 6 mm^2
3. Aluminium wire of 8 m and 1 mm^2
4. Copper wire of 8 m and 6 mm^2
5. Aluminium wire of 1 m and *6* mm^2

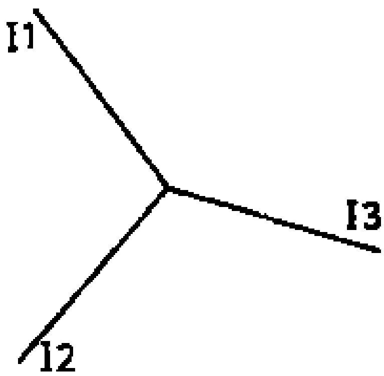
DC 19.4 If the current in a 1 k? resistor is 2 mA, the potential across the resistor is

1. 1 V
2. 20 V
3. 2 V
4. 200 V
5. 100 V

DC 19.5 In a series connection of two resistors

1. the current is at every point of the circuit the same.
2. the voltage is the same at both the resistors.
3. the total current is the sum of two part currents.
4. the total resistance is less than the smallest individual resistance.

DC 20.1 In a junction point



1. all currents have the same magnitude.
2. the sum of all coming is not equal to the sum of all going currents.
3. the going current is equal to the highest coming current.
4. the magnitude of current depends upon the size of the conductor.
5. the sum of all currents (coming = +; going = –) is equal to zero.

DC 20.2 In a parallel connection

1. the current is the same at every point of the connection.
2. the total resistance is the sum of all single resistances.

3. the voltage is the same at all the resistances.
4. the total voltage is the sum of all part voltages.

DC 20.3 If a series circuit consists of three resistors and a battery which of the following statements is always true?

1. The voltage drop across each resistor is the same.
2. The current through each resistor is the same.
3. The power dissipated in each resistor is the same.
4. The energy consumption in each resistor is the same.

DC 20.4 Two wires with different cross−sectional areas are connected in series. The heat produced by the current is greater in the thinner wire because

1. there is a higher voltage drop on it.
2. there is a higher current through it.
3. the electrons move faster and collisions are more forceful in it.
4. there are fewer collisions of electrons with the atoms in it. (V) it has low resistance value.

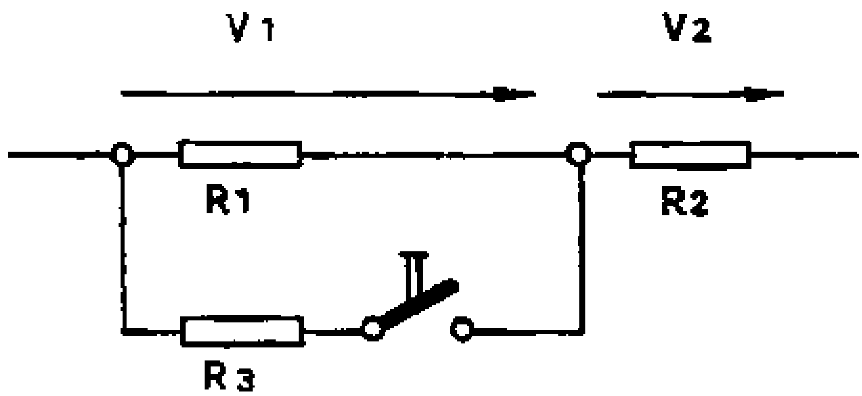
DC 21.1 An air−conditioner at the end of a long feeding line does not work properly because of too low voltage.

Which is the correct way to increase the voltage?

1. Put the air−conditioner close to the main switchboard.
2. Connect it with a flexible cable using the shortest possible distance.
3. Replace the feeding lines with thicker ones.
4. Replace the compressor motor with a smaller one.
5. Use the fan motor only.

DC 21.2 The connection shown here is supplied by a stable voltage v.

How will the voltage V1 and V2 change when the switch is closed?

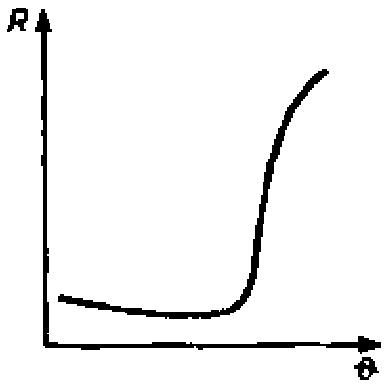


1. V1 decreases, V2 increases.
2. V1 increases, V2 decreases.
3. V1 and V2 decrease.
4. V1 and V2 increase.
5. V1 and V2 do not change.

DC 21.3 Which of the following resistances has a negative temperature coefficient?

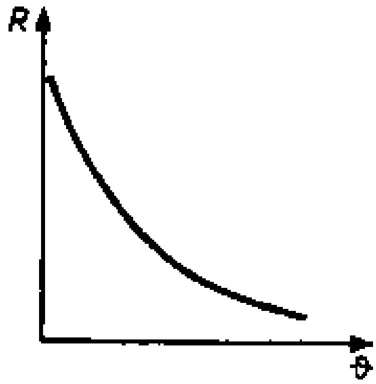
1. NTC−resistance (hot conductor)
2. PTC−resistance (cold conductor)
3. Resistance of a wire made of chrome nickel.
4. Resistance of a constantan wire.
5. Resistance of a manganin wire.

DC 21.4 Which of the resistances is represented by the curve shown?



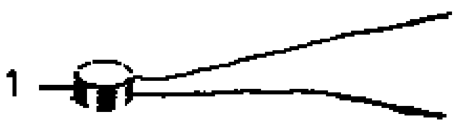
1. Potentiometer
2. Layer resistance
3. Hot conductor (NTC)
4. Cold conductor (PTC)
5. Voltage dependent resistance (VDR)

DC 22.1 Which of the resistances is represented by the curve shown in the figure?



1. Potentiometer
2. Layer resistance
3. Hot conductor (NTC)
4. Cold conductor (PTC)
5. Voltage dependent resistance (VDR)

DC 22.2 Which of the following statements is true about the hot conductor shown?



1. The disc 1 is made of graphite.

2. Hot conductors have a positive temperature coefficient, which is much higher than that of the metals.

3. Hot conductors have less conductivity at higher temperature.

4. When current flows through the hot conductor, its resistance becomes less.

5. When the current remains constant, the voltage drop across the hot conductor increases with temperature.

DC 22.3 Can electrical energy be easily converted into other forms of energy?

1. No, electrical energy cannot be easily converted into heat.
2. No, it can only be converted into mechanical energy.
3. Yes, it can be very easily converted into other forms of energy.
4. No, electrical energy cannot for example be converted into chemical energy.

5. No, electrical energy can be converted into heat, but the equipment required for this purpose is very costly.

DC 22.4 What is the unit of electrical energy?

1. Kilowatt (kW)
2. Kilowatthour (kWh)
3. Volt−ampere (VA)
4. Kilovolt−ampere (kVA)
5. Ampere−hour (Ah)

DC 23.1 Which quantity of heat is equivalent to 1 Ws?

1. 1 cal
2. 1 kcal
3. 1°C
4. 0.1 cal
5. 1 J (Joule)

DC 23.2 Which of the following formulae for calculating, the electrical power is correct?

1. $P = V \times I \times t$
2. $P = V \times I$
3. $P = V \times I \times R$
4. $P = \frac{V \times I}{t}$
5. $P = \frac{V \times I \times R}{t}$

DC 23.3 Which of the following formulae for calculating the electrical power is correct?

1. $P = I \times R$
2. $P = \frac{I}{R}$
3. $P = \frac{I^2}{R}$
4. $P = \frac{R}{I}$
5. $P = I^2 \times R$

DC 23.4 What are the units for electrical power?

1. Watt second, kilowatt hour (Ws, kWh)
2. Joule, kilojoule (J, kJ)
3. H.P.
4. Watt, kilowatt (W, kW)
5. Newtonmeter (Nm)

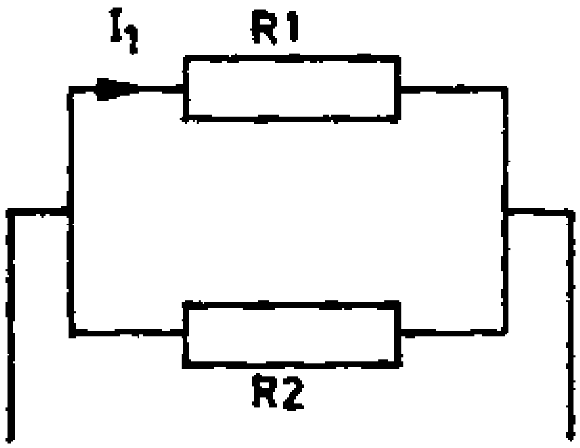
DC 23.5 Which of the machines or appliances has the highest efficiency?

1. Otto motor
2. Steam turbine
3. Electric motor
4. Filament lamp
5. Immersion heater

DC 24.1 A diesel engine (efficiency $?_1$) runs an electric generator (efficiency $?_2$), which supplies electrical energy to an electric motor having an efficiency of $?_3$. What will be the total efficiency of the system?

1. $? = ?_1 + ?_2 + ?_3$
2. $? = ?_3 - ?_2 - ?_1$
3. $? = ?_1 \times ?_2 \times ?_3$
4. $\eta = \frac{\eta_1 \times \eta_2}{\eta_3}$
5. $\eta = \frac{\eta_1 + \eta_2 + \eta_3}{100}$

DC 24.2 Two resistors are connected in parallel to a stable voltage source. How do current and power of the resistor R1 change when the resistance of R2 is decreased by half?



1. I1 constant, P1 decreases
2. I1 increases, P1 constant
3. I1 and P1 constant
4. I1 and P1 decrease
5. I1 and P1 increase

DC 24.3 If on a constant resistance we increase the supply voltage to double its value, then the power will

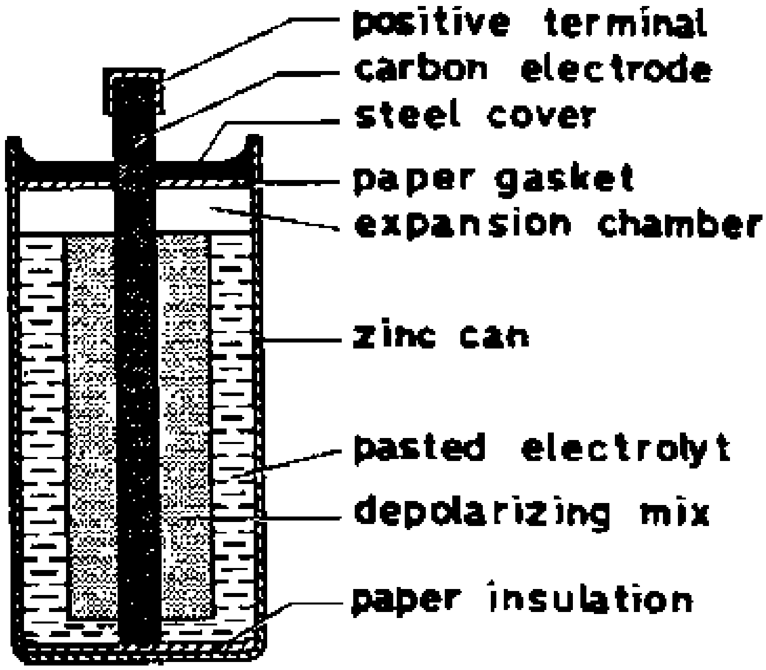
1. increase by 1/3.
2. be half.
3. be double.
4. be four tines as high.
5. be the same.

DC 24.4 Efficiency is

1. the difference between power input and output.
2. the relation of power input to power output.
3. the relation of power output to the power losses.
4. the percentage of power output compared with the input.
5. the percentage of power input compared with the output.

Chemical Effect

CE 1.1 Which of the following statements about the zinc–carbon cell shown in the figure is true?

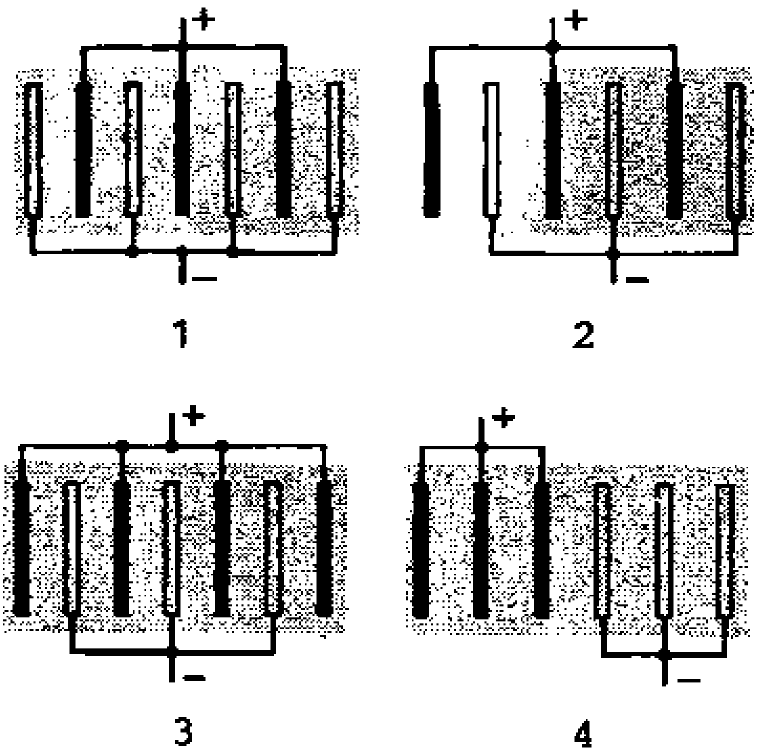


1. The zinc container has a potential of +1.5 V against the carbon electrode.
2. The air in the air space is needed for the oxidation of zinc.
3. When current is drawn from the cell the carbon rod is partly consumed.
4. The electrolyte used in this cell consists of a solution of sodium carbonate.
5. The depolarizer mainly contains brown iron ore and carbon powder.

CE 1.2 What is the function of the depolarizer in a carbon−zinc cell?

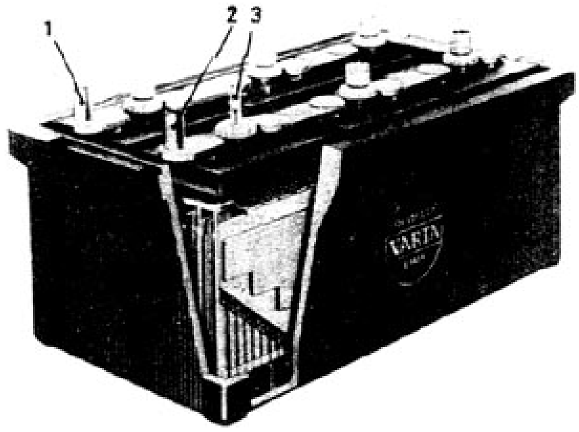
1. It converts the produced hydrogen into water.
2. It prevents the fast chemical action on the zinc container.
3. It synthesizes the decomposed electrolyte.
4. It increases the internal resistance of the cell.
5. It absorbs the oxygen produced in the cell.

CE 1.3 Which of the following diagrams shows the correct connection of the plates of a lead acid. battery?



1. Sketch 1
2. Sketches 1 and 2
3. Sketch 2
4. Sketch 3
5. Sketch 4

CE 2.1 What is the voltage which can be drawn from terminals 1 and 2 of the storage battery shown in the figure?



1. 4.5 V
2. 6 V
3. 9 V
4. 12 V
5. 24 V

CE 2.2 What is measured by the equipment marked 3 in the above figure?

1. The level of acid.
2. The temperature of acid.
3. The density of acid.
4. The concentration of acid.
5. The charging condition of the battery.

CE 2.3 What can be determined with the help of the apparatus shown in the figure?

1. The temperature of acid in a storage battery.
2. The density of acid in a storage battery.
3. The level of acid in a storage battery.
4. The purity of acid in a storage battery.

5. Whether the plates of a battery are damaged or not.

CE 3.1 How many cells has the storage battery shown in the figure?

1. 1 cell
2. 2 cells
3. 3 cells
4. 4 cells
5. 6 cells

CE 3.2 What conclusion can be directly drawn from the density of the acid in a lead acid battery?

1. About eventual damages caused to the plates.
2. About the level of the acid.
3. About the e.m.f. of the battery.
4. About the charge of the battery.
5. About the internal resistance of the battery.

CE 3.3 The acid in a lead acid battery built into a clock installation gases constantly. What is the reason?

1. The controller of the battery charger is faulty, so that the battery is overcharged.
2. A too high current is being drawn from the battery.
3. There is an untraced short circuit in the installation.
4. The surrounding temperature of the battery is often more than 20°C.
5. The battery discharges at a too low rate.

CE 4.1 Which precaution is to be kept in mind to avoid accidents during battery charging?

1. Explosive oxy−hydrogen gas is formed in case of overcharging.
2. During charging poisonous chlorine gas is formed.
3. Anaesthetic nitrous oxides are formed during overcharging.
4. Due to heating up the acid boils and can spill out of the battery.
5. Over voltages are produced during charging which can lead to electric accidents.

CE 4.2 What does the expression C_{10} = 160 Ah mean for a battery?

1. The capacity of the battery is 160 Ah at 10°C.
2. The capacity of the battery is 160 Ah at 10 A discharging current.
3. The capacity of the battery is 160 Ah at 10 V.
4. The capacity of the battery is 160 Ah for a discharging time of 10 hours.
5. The capacity of the battery is 160 Ah in case 10 cells are connected in series.

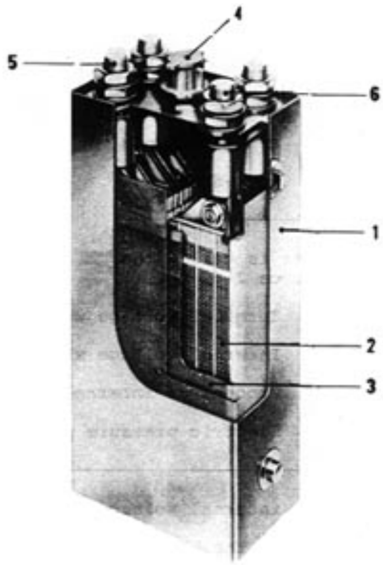
CE 4.3 How much current can be approx. drawn for 10 hours from the battery shown?

1. 0.03 A
2. 0.15 A
3. 0.3 A
4. 1.5 A
5. 3 A

CE 4.4 Which of the following acts as a depolarizer in a dry cell?

1. Carbon powder
2. Manganese dioxide
3. Ammonium chloride
4. Zinc chloride
5. Starch or flour

CE 5.1 What voltage supplies the storage battery shown in the figure?



1. 1 V
2. 1.2 V
3. 1.4 V
4. 1.5 V
5. 2 V

CE 5.2 The figure shows an iron−nickel battery. Which of the following statements about it is true?

1. The voltage between terminals 5 and 6 is 1.5 V.
2. The housing 1 is made of a corrosion resistant copper plate.
3. Plate 2 is made of lead.
4. A very pure potash solution is filled in this battery.
5. Cover 4 must be air tight.

CE 5.3 What is the advantage of the iron−nickel battery over the lead−acid battery?

1. The cell voltage of the iron−nickel battery is higher.
2. It has a much higher efficiency.
3. It needs less maintenance.
4. It is much cheaper.
5. It can also be installed in the open air.

CE 6.1 The storage batteries are rated in

1. ampere−volts.
2. ampere−seconds.
3. watt−hours.
4. ampere hours.
5. watts.

CE 6.2 What is called the electro−motive force (e.m.f.) of a voltage source?

1. Terminal voltage when load is applied.
2. Internal voltage when no load is applied.
3. Product of internal resistance and load current.
4. Electric pressure provided to the load.

CE 6.3 The internal voltage drop of a voltage source

1. is the highest when no load is applied.
2. does not influence the terminal voltage.
3. depends upon the internal resistance of the source.
4. decreases with increasing load current.
5. depends upon the rated voltage of the source.

CE 6.4 Which statement about the storage battery is true?

1. It delivers current as soon as its components are put together.

2. It does not deliver current when its components are put together, until it is charged from an external source.

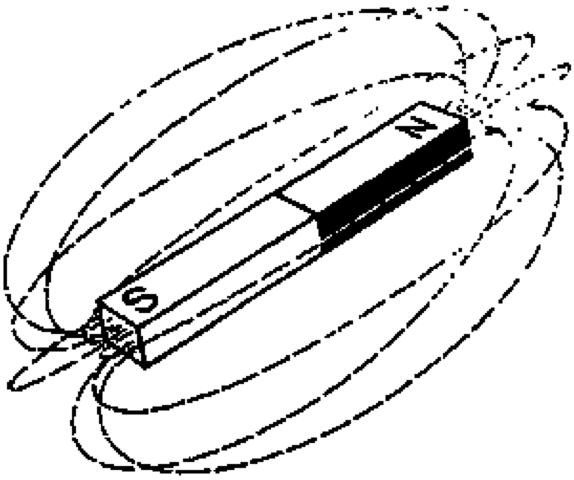
3. It has lead as positive plates.

4. When fully discharged both the plates become PbO_2.

5. When fully discharged the specific gravity of its liquid is increased.

Magnetical Effect

ME 1.1 There is a special state existing around the magnet shown in the figure. How is this state caused?



1. By a gravitational field.
2. By an electric field.
3. By a magnetic field.
4. By an electro−magnetic field.
5. By a magnetic line of force.

ME 1.2 What happens when iron is magnetized?

1. The free electrons gather at the “south” pole.
2. The free electrons gather at the “north” pole.
3. The iron is charged electrically.
4. The elementary magnets arrange themselves.
5. The magnetization causes a change in the lattice structure.

ME 1.3 What is meant by remanent magnetism?

1. The magnetism which is produced by an electric current.
2. The magnetism which is left in the iron after the removal of the magnetic field.
3. The magnetism exhibited in non−magnetic metals.
4. The magnetism produced by the supra conductor coils.
5. The magnetism produced by alternating current.

ME 1.4 A magnet is able to attract

1. iron, aluminium and brass.
2. iron, cobalt and zinc.
3. iron, copper and nickel.
4. iron, cobalt and brass.
5. nickel, cobalt and steel.

ME 2.1 Comparing a magnetic circuit with an electric circuit the equivalent for the magnetic flux is

1. the conductivity of the lines.
2. the resistance of the load.
3. the current in the lines.
4. the voltage of the source.
5. the power of the load.

ME 2.2 What is meant by permeability?

1. Strength of a permanent magnet.
2. Strength of an electro magnet.
3. The magnetism left in the iron after the exciting field has been removed.
4. The repulsion of two similar poles.
5. The conductivity of a material for the magnetic flux (magnetic lines of force).

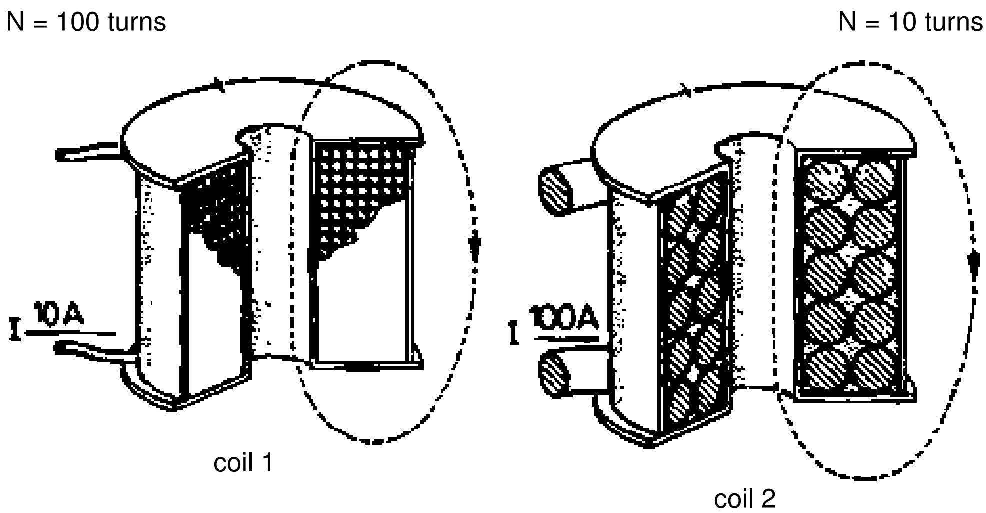
ME 2.3 What is the unit and symbol for the magnetic flux?

1. Unit: Tesla (T); symbol: B
2. Unit: Maxwell (M); symbol: ?
3. Unit: Tesla (T); symbol: ?
4. Unit: Weber (Wb); symbol: ?
5. Unit: Tesla (T); symbol: ?

ME 2.4 When the magnetic flux and the area under its influence are known, how can one calculate the magnetic flux density?

1. B = ? × A
2. $B = \frac{\Phi}{A}$
3. $B = \frac{A}{\Phi}$
4. B = ? × A^2
5. $B = \frac{\Phi}{A^2}$

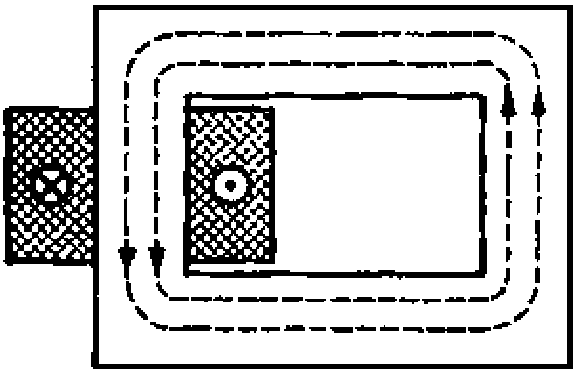
ME 3.1 Which of the two coils shown in the figure produces more magnetic flux?



1. Coil 1, because the number of turns is greater.
2. Coil 2, because the current strength is higher.
3. Coil 2, because the area of cross−section is greater.
4. Coil 1, because the length of the wire is greater.
5. The magnetic flux in both the coils is the same, because the magnetomotive force of both the coils is the same.

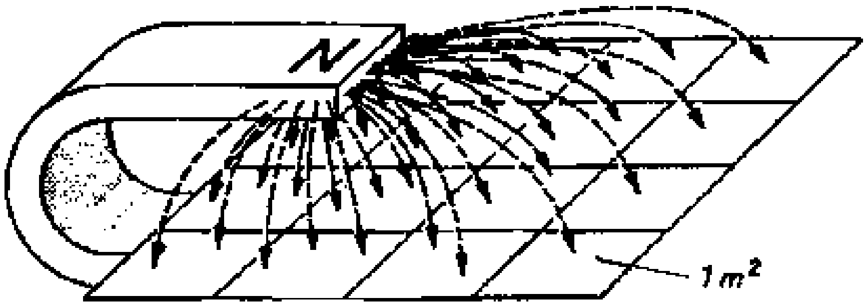
ME 3.2 The figure shows a coil with a closed iron core.

What do the dotted lines represent?



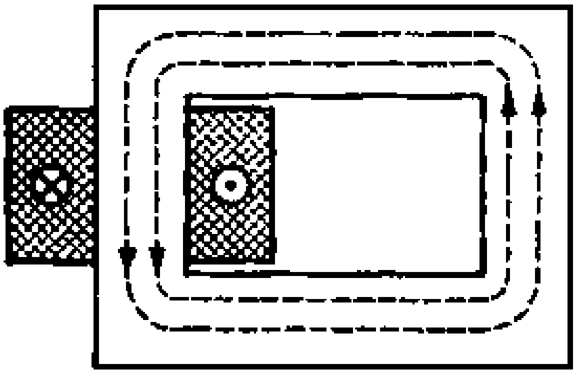
1. The magneto−motive force.
2. The magnetic flux.
3. The magnetic field strength.
4. The magnetic potential.
5. Remanence.

ME 3.3 What is flux density (flux per unit area)?



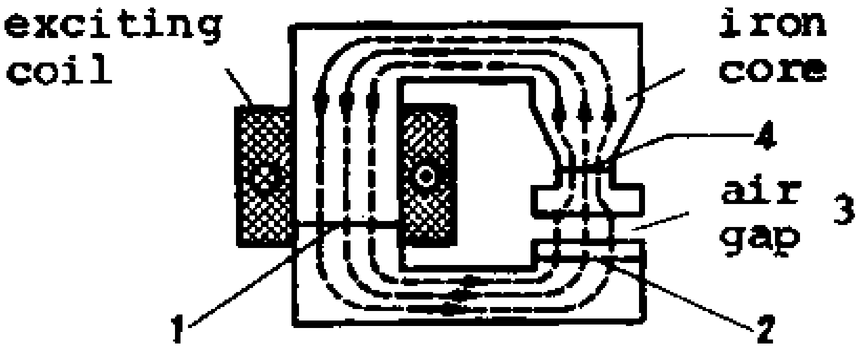
1. A magnetic field strength.
2. A magneto−motive force.
3. A permeability.
4. A magnetic pole strength.
5. A magnetic induction.

ME 4.1 How can the magnetic flux in the magnetic circuit shown in the figure be increased?



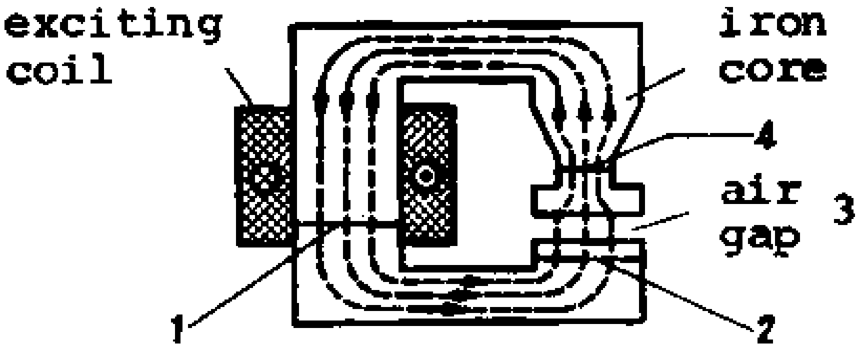
1. By decreasing the magneto−motive force.
2. By increasing the magneto−motive force.
3. By making an air gap in the core.
4. By decreasing the area of cross−section of the core.
5. By reversing the direction of current.

ME 4.2 At which cross−section of the magnetic circuit shown in the figure is the magnetic flux highest?



1. At cross−section 1
2. At cross−section 2
3. At cross−section 3
4. At cross−section 4
5. The magnetic flux is the same at all places of the magnetic circuit.

ME 4.3 At which cross−section of the magnetic circuit shown in the figure is the magnetic flux density the highest?

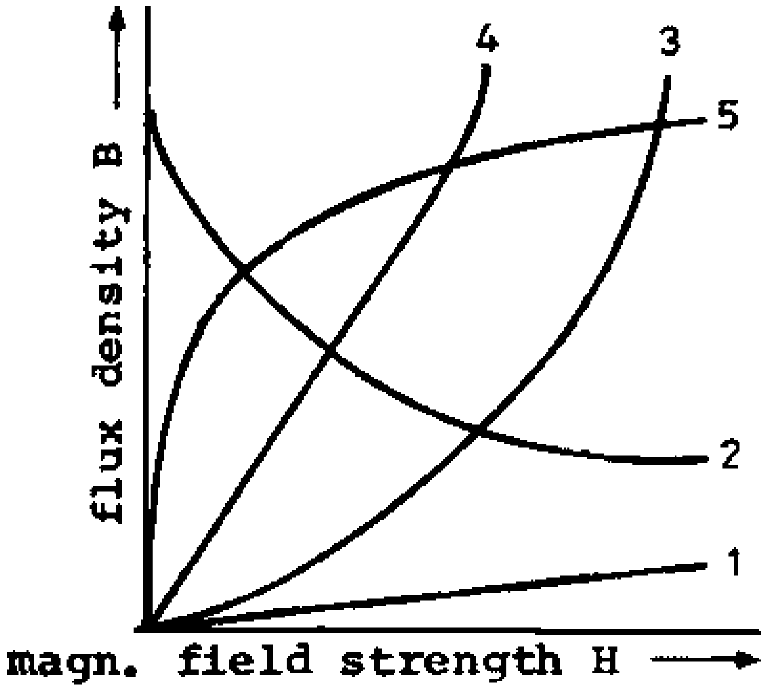


1. At cross−section 1
2. At cross−section 2
3. At cross−section 3
4. At cross−section 4
5. The magnetic flux density is the same at all places of the magnetic circuit.

ME 4.4 The direction of the magnetic lines of forces is

1. from + to − charges.
2. from south to north pole.
3. from one end of the magnet to the other.
4. from north to south pole.

ME 5.1 Which of the curves shows the relation between the flux density B and the magnetic field strength H for a dynamo sheet?



1. Curve 1
2. Curve 2
3. Curve 3
4. Curve 4
5. Curve 5

ME 5.2 What is meant by magnetic saturation of iron?

1. Strengthening of the magnetic field by using iron. (permeability).

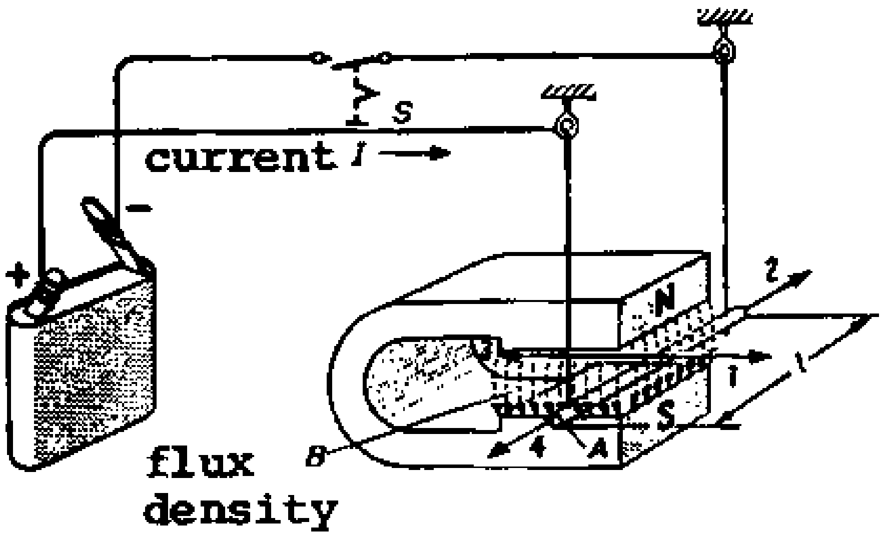
2. The part of the magnetisation curve in which the change in magnetic field strength H causes a little change in the magnetic flux density B.

3. The losses during magnetisation.

4. The part of the magnetisation curve in which the change in magnetic field strength H causes a great change in the magnetic flux density B.

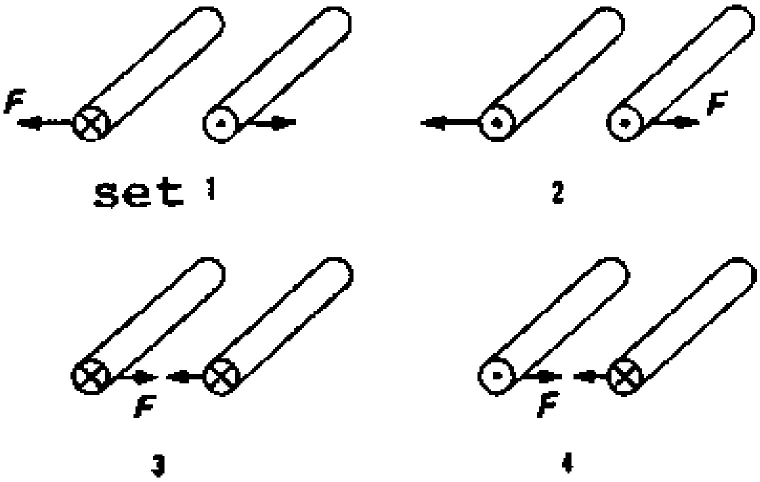
5. In the region of saturation the elementary magnets are not yet arranged fully.

ME 5.3 What happens when the switch shown in the figure is closed?



1. The conductor marked A moves in direction 1.
2. The conductor marked A moves in direction 2.
3. The conductor marked A moves in direction 3.
4. The conductor marked A moves in direction 4.
5. The conductor marked A is attracted by the north pole.

ME 6.1 Two current carrying conductors are shown in the figure. Which of the sets show(s) the correct direction of force corresponding to the indicated direction of current?

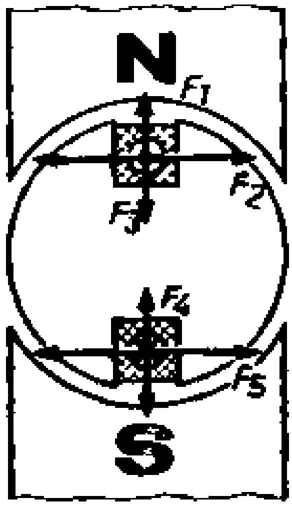


1. Only set 1
2. Only set 2
3. Only set 3
4. Sets 2 and 4
5. Sets 1 and 3

ME 6.2 A current carrying conductor of length ℓ is under the influence of a magnetic field having a magnetic flux density B. If I is the current flowing through the conductor, which of the following formulae is correct for calculating the force exerted on it?

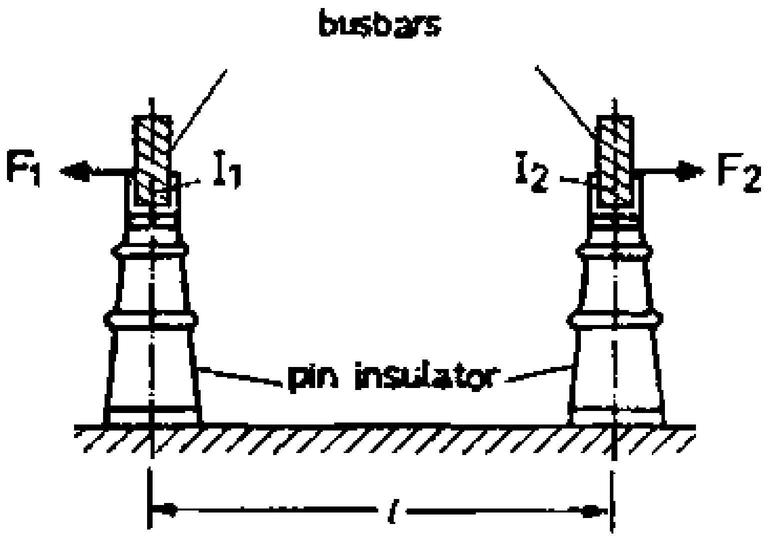
1. $F = B \times \ell \times I^2$
2. $F = \frac{B \times I}{\ell}$
3. $F = \frac{I \times \ell}{B}$
4. $F = B \times \ell \times I$
5. $F = \frac{B \times \ell}{I}$

ME 6.3 Which of the arrows represents the correct direction of force in the shown figure?



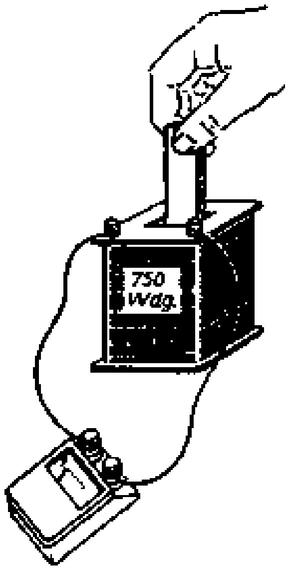
1. Arrow F_1
2. Arrow F_2
3. Arrow F_3
4. Arrow F_4
5. Arrow F_5

ME 7.1 Which of the values shown in the figure influence the repulsive forces F_1 and F_2?



1. Only the current I_1
2. Only the current I_2
3. Only the sum of currents I_1 and I_2
4. The product of I and I and the distance ℓ.
5. Only the product of I_1 and I_2.

ME 7.2 Which of the following statements for the experimental arrangement shown in the figure is true?



1. When the magnet is inserted in the coil, a D.C. voltage is produced.

2. When the magnet is taken out of the coil, a trapezoidal alternating voltage is produced.

3. No matter if the magnet is inserted in or taken out of the coil, an alternating voltage is produced in any case.

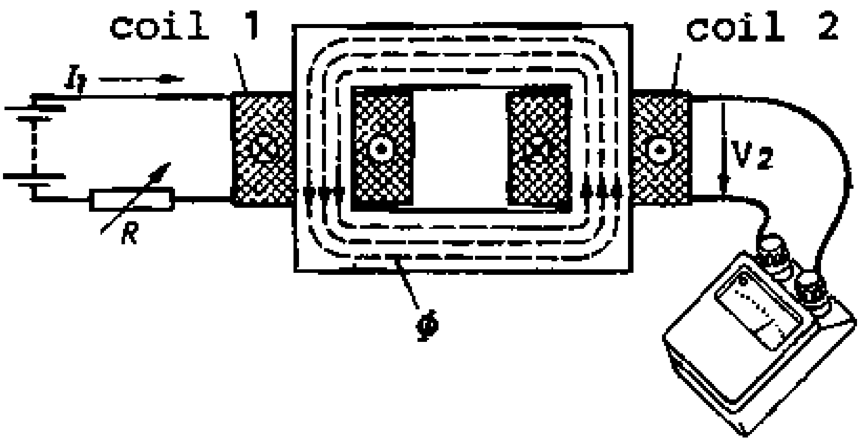
4. When the magnet is inserted in the coil, a sinusoidal voltage is produced.

5. No matter if the magnet is inserted in or taken out of the coil, no voltage is produced as the circuit is not closed.

ME 7.3 What is a simple method of increasing the voltage of an available D.C. generator?

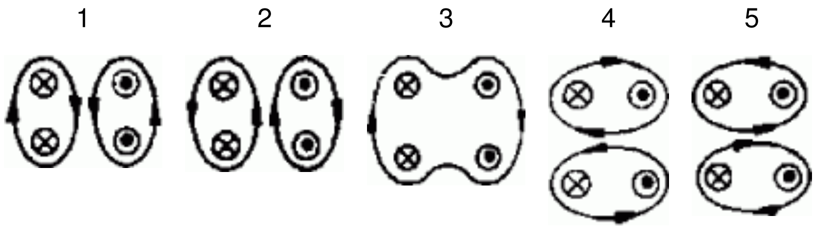
1. By reducing the air gap flux density.
2. By increasing the speed of rotation.
3. By decreasing the speed of rotation.
4. By increasing the length of the armature.
5. By decreasing the length of the armature.

ME 8.1 At which of the mentioned moments is no voltage ($V_2 = 0$) induced in coil 2?



1. When current I_1 is switched on.
2. When current I_1 is constant, e.g. its value is 20 A.
3. When current I_1 is switched off.
4. When current I_1 is reduced.
5. When current I_1 is increased.

ME 8.2 Which of the following sketches shows the correct magnetic field?

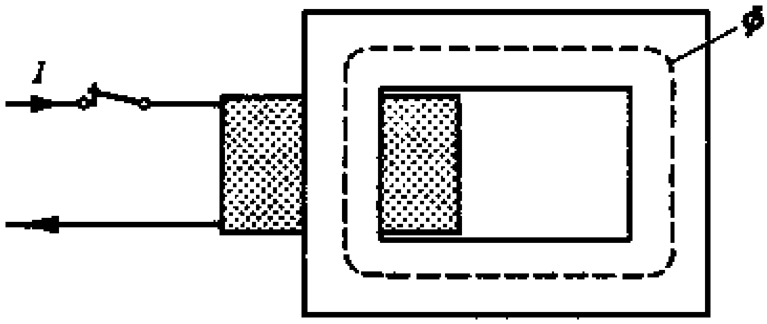


ME 8.3 Two parallel conductors are carrying currents in the same direction.

Which of the following statements is correct?

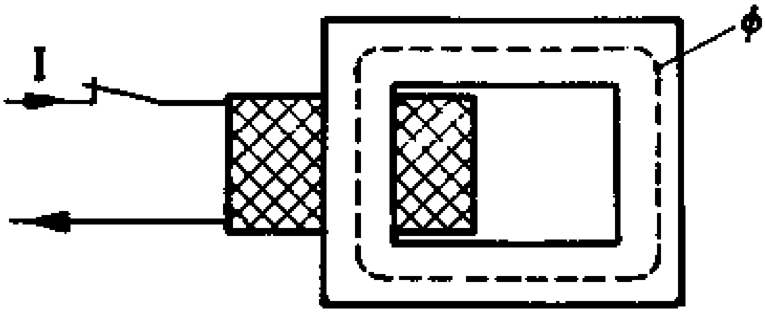
1. There is a repelling force.
2. The force increases when the current is decreased.
3. There is an attracting force between the conductors.
4. The force increases when the distance between the conductors is increased.
5. The force does not depend upon the length of the conductors.

ME 9.1 Under which of the conditions is there no self induced voltage in the coil?



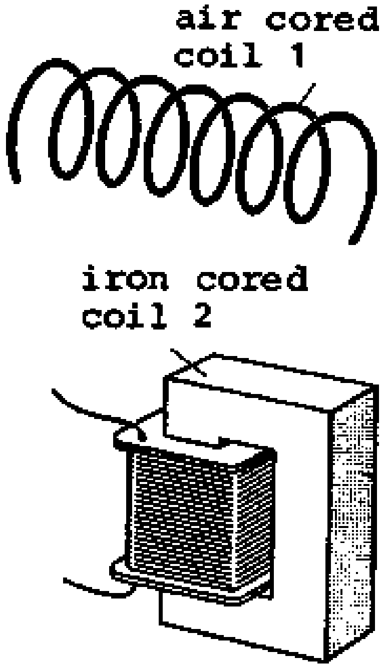
1. When a constant direct current of 50 A flows through the coil.
2. When current I increases from 0 to 0.1 A in 1 second.
3. When current I decreases. from 0.1 to 0 A in 1 second.
4. When current I increases from 25 A to 26 A in 1 second.
5. When current I decreases from 26 A to 25 A in 1 second.

ME 9.2 Which of the following values does not influence the self induced voltage of the coil?



1. No. of turns of the coil.
2. The change in current.
3. The duration in which the change in current takes place.
4. The magnetic resistance of the magnetic circuit.
5. The voltage applied at the coil.

ME 9.3 Which of the following statements about the inductance of the two coils shown in the figure is true? air cored coil 1



1. The inductance of the air cored coil 1 is higher than that of the iron cored coil 2.

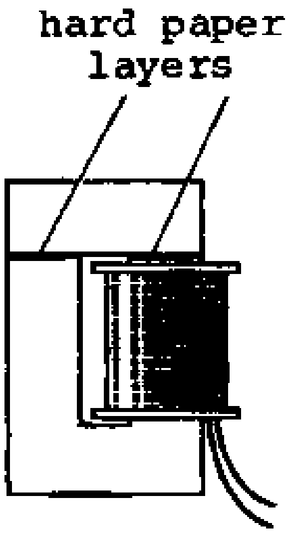
2. At the same change of current a higher self induced voltage is produced in coil 1 as compared to that produced in coil 2.

3. Due to the same change of current a lower self induced voltage is produced in coil 1 as compared to that produced in coil 2.

4. Both the coils are practically similar from the view point of their inductivity.

5. Inductance of both the coils is the same in case of direct current.

ME 10.1 How can the inductance of the coil shown in the figure be increased?



1. By thicker layers of hard paper in the gap.
2. By decreasing the current.
3. By increasing the no. of turns.
4. By connecting an ohmic resistance in series.
5. By connecting an ohmic resistance in parallel.

ME 10.2 The north pole of a magnetic needle points to

1. the geographic south pole of the earth.
2. the magnetic north pole of the earth.
3. whatever pole it happens to be close.
4. the magnetic south pole of the earth.

ME 10.3 Is it possible to prevent by very fast operation of the switch the switching spark produced during switching off of an inductance?

1. No, the faster the circuit is opened, the higher is the self induced voltage.
2. Yes, as long as the circuit is opened fast enough.
3. Yes, as long as the. switch can withstand the high switching speed.
4. Yes, if the current is less than 50 A.
5. No, if the current is more than 1 A.

ME 10.4 The direction of the induced current depends upon

1. the length of the conductor.
2. the speed of the movement of the conductor.
3. the strength of the magnetic field.
4. the direction of the magnetic field.
5. the number of conductors being moved.

ME 11.1 Which is the unit and symbol for inductance?

	symbol	unit
1.	R m	Weber (Wb)
2.	X_L	Henry (H)
3.	?	Gauss (G)
4.	L	Gauss (G)
5.	L	Henry (H)

ME 11.2 Which of the following statements about inductance of a coil is true?

1. Inductance is only another expression for self induced voltage.

2. Inductance is a characteristic of coils occurring only in case of A. C.

3. Inductance appears only if the coil has an iron core.

4. Inductance characterizes the magnetic properties of a coil which are significant for the value of self induced voltage generated due to current change in the coil.

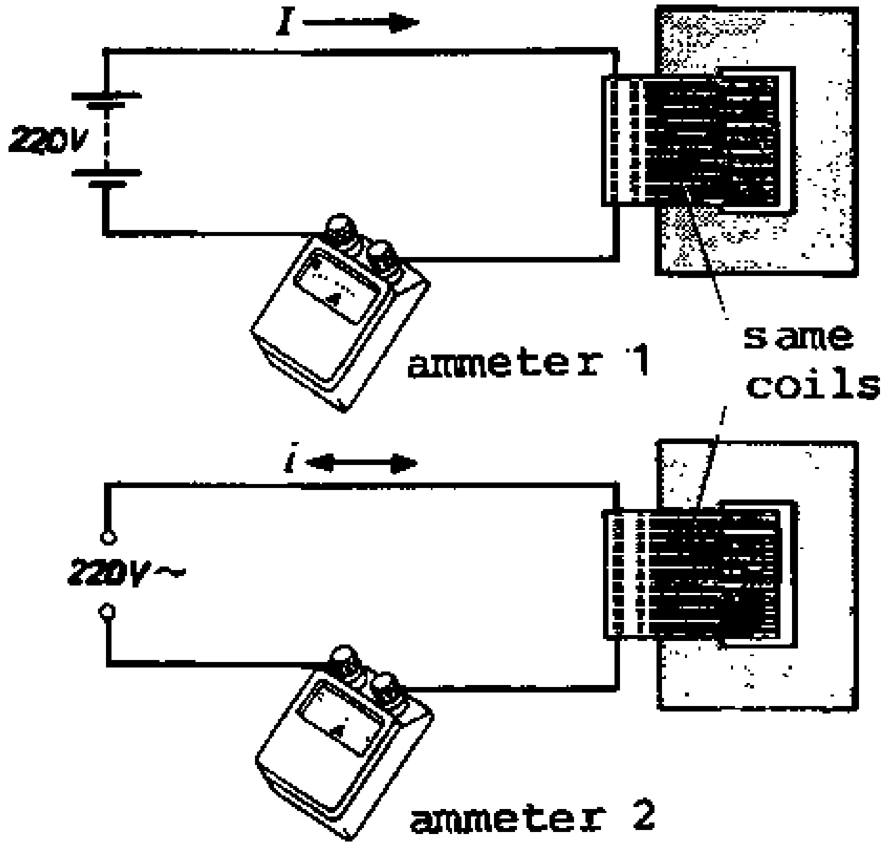
5. Inductance is a characteristic occurring only in case of a high no. of turns.

ME 11.3 A contactor coil is designed for 220 V D.C.

What happens if it is connected to 220 V A.C.?

1. A too large current is drawn by the coil and it is destroyed.
2. A too small current is drawn by the coil and the operation of the contactor is no longer certain.
3. The permanent magnet of the magnetic system is demagnetized.
4. The coil insulation is quickly damaged by the alternating voltage.
5. The magnetic system is not laminated. Thus high eddy. currents are produced causing high losses.

ME 12.1 Which of the following statements is true?



1. The ammeter 1 indicates a higher current because the inductance of the coil is not effected.

2. The ammeter 2 indicates a higher current because the inductance of the coil has less effect on the alternating current than on the direct current.

3. The ammeter 2 indicates 0 current because alternating current cannot flow through a coil.

4. The ammeter 1 indicates 0 current because direct current cannot flow through a coil.

5. Both the ammeters indicate more or less the same current.

ME 12.2 What is the effect of the inductance of a coil on a constant direct current?

1. It decreases the current.
2. It strengthens the current.
3. It causes a higher voltage drop.
4. It decreases the voltage drop.
5. It does not effect the constant direct current.

ME 12.3 When a current carrying conductor is brought into a magnetic field, we can detect a force that is moving the conductor. The strength of this force depends upon

1. the weight of the conductor.
2. the direction of the conductor.
3. the length of the conductor within the magnetic field.
4. the current strength.
5. the direction of the magnetic field.

ME 13.1 A contactor coil is designed for 220 V A.C. What happens if it is connected to 220 V D.C.?

1. A too large current is drawn by the coil and it is destroyed.
2. A too small current is drawn by the coil and the operation of the contactor is no longer certain.
3. The magnetic system is magnetized and will remain energized after the current is disconnected.
4. The coil is charged electrostatically.
5. The coil insulation is quickly damaged by the direct voltage.

ME 13.2 The sign $\otimes$ in a plan view of a conductor means

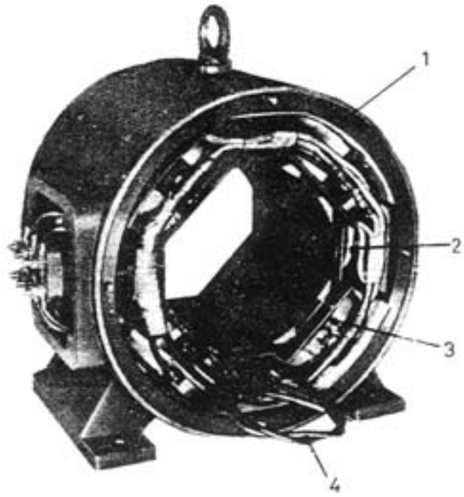
1. the current flows into the drawing area.
2. the current flows out of the drawing area.
3. there is a positive current in the conductor.
4. we cannot apply the cork screw rule.
5. the conductor is connected to the positive terminal.

ME 13.3 On which does a good smoothing factor of a coil depend?

1. Cross sectional area of the wire of the coil.
2. Terminal voltage.
3. Property of the wire of the coil.
4. Resistance of the coil.
5. Inductivity of the coil.

DC–Machines

DC–M 1.1 What does the figure represent?



1. The stator of an induction motor.
2. The stator of a salient pole synchronous motor.
3. The stator of a wound rotor synchronous motor.
4. The stator of a D.C. machine with commutating poles.
5. The stator of a D.C. machine without commutating poles.

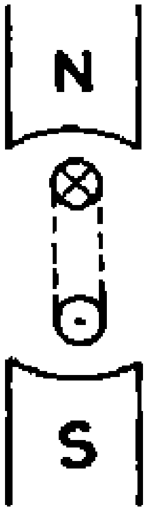
DC–M 1.2 In the above figure, what does the part marked 2 represent?

1. Series winding,
2. Auxiliary series winding.
3. Compensating winding.
4. Commutating pole winding.
5. Main field winding.

DC–M 1.3 In the above figure, how are the coils marked 2 connected?

1. In series with the shunt winding.
2. Parallel to the shunt winding.
3. In series with the armature winding.
4. Parallel to the armature winding.
5. Parallel to the series winding.

DC–M 2.1 When a current carrying coil (shown below) is placed within a magnetic field, a force will move the coil

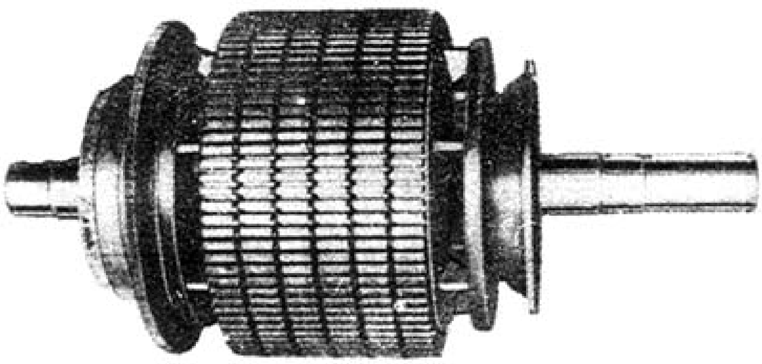


1. to the right.
2. to the left.
3. clockwise.
4. anti–clockwise.
5. upward.

DC–M 2.2 The direction of rotation of a D.C. motor is reversed by

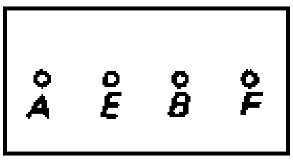
1. reversing armature connections.
2. interchanging the armature and field connection.
3. adding resistance to the field circuit.
4. reversing supply connections.

DC–M 2.3 Why is the armature of D.C. motors laminated?



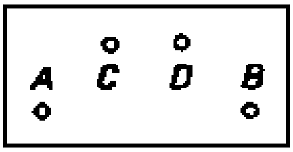
1. To reduce the hysteresis losses.
2. To reduce the eddy current losses.
3. To reduce the eddy current and hysteresis losses.
4. To reduce the inductivity of the armature.
5. To reduce the mass of the armature.

DC–M 2.4 The terminal board of a motor is as shown in the diagram. Which type of motor is this?



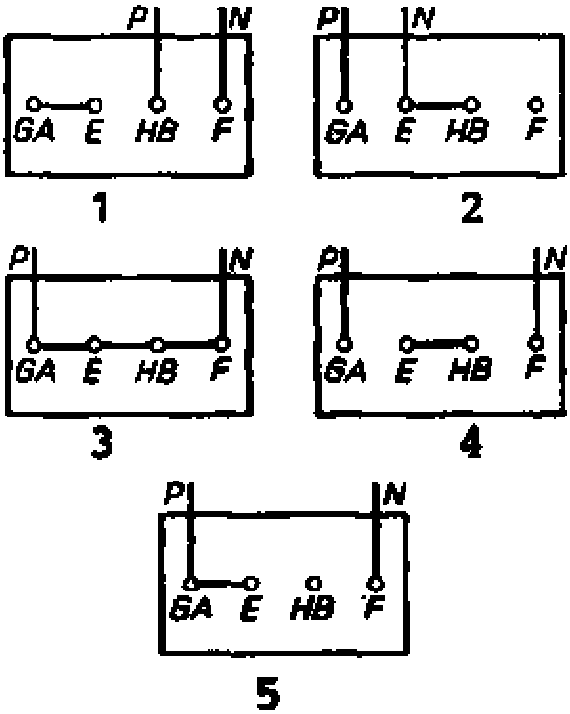
1. A compound motor with commutating pole winding.
2. A shunt motor with commutating pole winding.
3. A shunt motor without commutating pole winding.
4. A series motor with commutating pole winding.
5. A series motor without commutating pole winding.

DC–M 3.1 The terminal board of a motor is shown in the diagram. Which type of motor is this?



1. A compound motor with commutating pole winding.
2. A shunt motor with commutating pole winding.
3. A shunt motor without commutating pole winding.
4. A series motor with commutating pole winding.
5. A series motor without commutating pole winding.

DC–M 3.2 In which of the following sketches is the motor connected to run in anticlockwise direction?

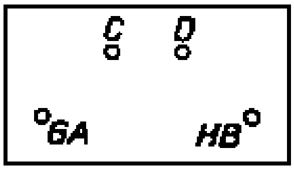


1. Sketch 1
2. Sketch 2
3. Sketch 3
4. Sketch 4
5. Sketch 5

DC–M 3.3 Which of the following is a correct statement about a series motor?

1. Its field winding consists of thicker wire and less turns.
2. It can run without load easily.
3. It has an almost constant speed.
4. It has a poor torque.
5. Its armature is directly connected across the supply.

DC–M 4.1 The terminal board of a motor is as shown in the diagram. Which type of motor is this?

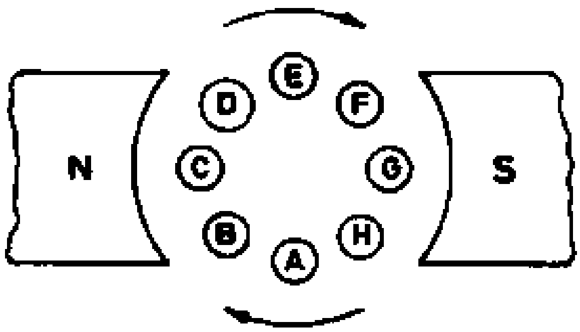


1. A compound motor without commutating pole winding.
2. A shunt motor with distributed commutating pole winding.
3. A shunt motor without commutating pole winding.
4. A series motor with distributed commutating pole winding.
5. A series motor without commutating pole winding.

DC–M 4.2 The rotating part of a D.C. motor is known as

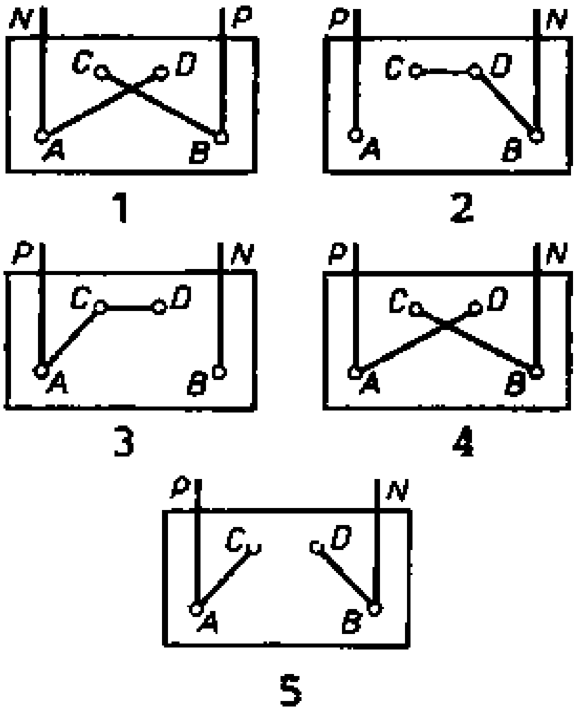
1. pole.
2. stator.
3. armature.
4. carbon brush.
5. commutator.

DC–M 4.3 A conductor is rotating within a magnetic field. At which of the shown positions do the peak voltages occur?



1. at position A.
2. at pos. B and F.
3. at pos. C and G.
4. at pos. D and H.
5. at pos. A and E.

DC–M 4.4 In which of the following sketches is the motor connected to run in clockwise direction?

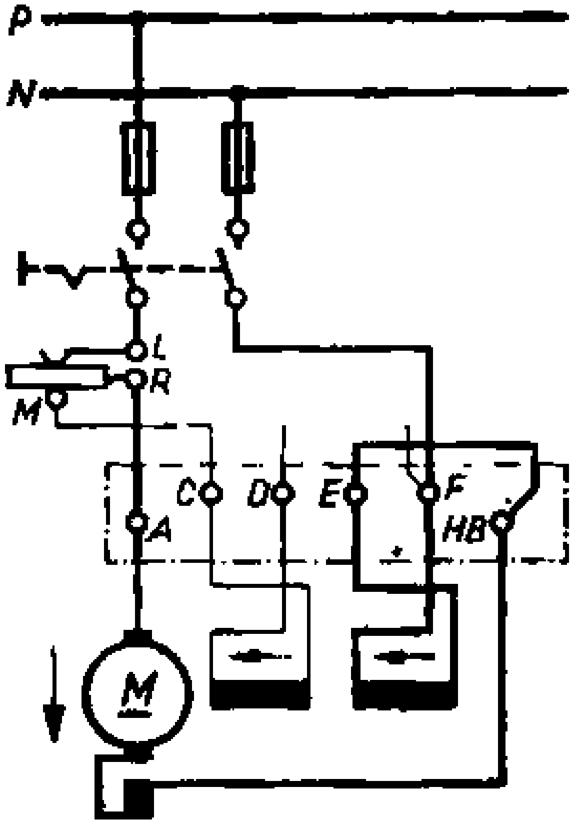


1. Sketch 1
2. Sketch 2
3. Sketch 3
4. Sketch 4
5. Sketch 5

DC–M 5.1 Which of the following D.C. motors has the least drop in speed between no load and nominal load?

1. Shunt motor with commutating poles.
2. Series motor without commutating poles.
3. Compound motor without commutating poles.
4. Series motor with commutating poles.
5. Compound motor with commutating poles.

DC–M 5.2 What is represented by the diagram shown in the figure?



1. A compound generator with auxiliary series winding.
2. A shunt generator with commutating pole winding and compensating winding.
3. A shunt motor with commutating pole winding and compensating winding.
4. A compound motor with auxiliary series winding and commutating pole winding.
5. A compound motor with reverse series winding and commutating pole winding.

DC–M 5.3 For which of the following D.C. motors is the typical field of application mentioned?

1. Shunt motor: electric trains
2. Series motor: machine tools
3. Series motor: belt drive
4. Compound motor: fly wheel drive
5. Compound motor: pumps and compressors

DC–M 5.4 The generator of a power station produces an electric pressure by

1. conversion of heat.
2. chemical conversion.
3. conversion of light.
4. magnetic induction.
5. mechanical pressure.

DC–M 6.1 Why is the air gap between stator and armature of an electric motor kept as small as possible?

1. To get a stronger magnetic field.
2. To make the rotation easier.
3. To reach a higher speed of rotation.
4. To improve the air circulation.
5. To avoid overheating of the armature.

DC–M 6.2 Which of the following types of generators gives constant voltage output at all loads?

1. Series generator
2. Shunt generator
3. Short shunt compound generator

4. Level compound generator
5. Long−shunt compound generator

DC−M 6.3 Interpoles are meant for

1. increasing the speed of the motor.
2. decreasing counter e.m.f.
3. strengthening the main field.
4. reducing sparking at the commutator.

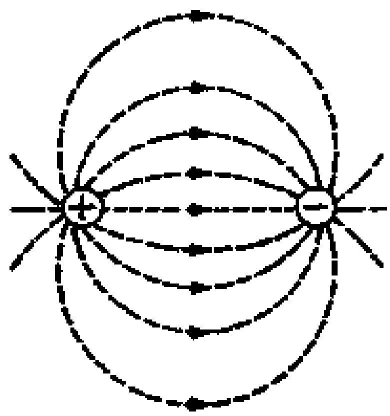
DC−M 6.4 What happens if the field winding of a running shunt motor suddenly breaks open?

1. Its speed slows down.
2. Its speed becomes dangerously high.
3. It gives out sparks.
4. It stops at once.
5. It continues to fun unaffected.

AC−Circuit

AC 1.1 Between the charged spheres "+" and "−" there is a special state which is represented by dotted lines.

How is this special state termed?



1. Magnetic field
2. Gravitational field
3. Electric field
4. Flow field
5. Electromagnetic field

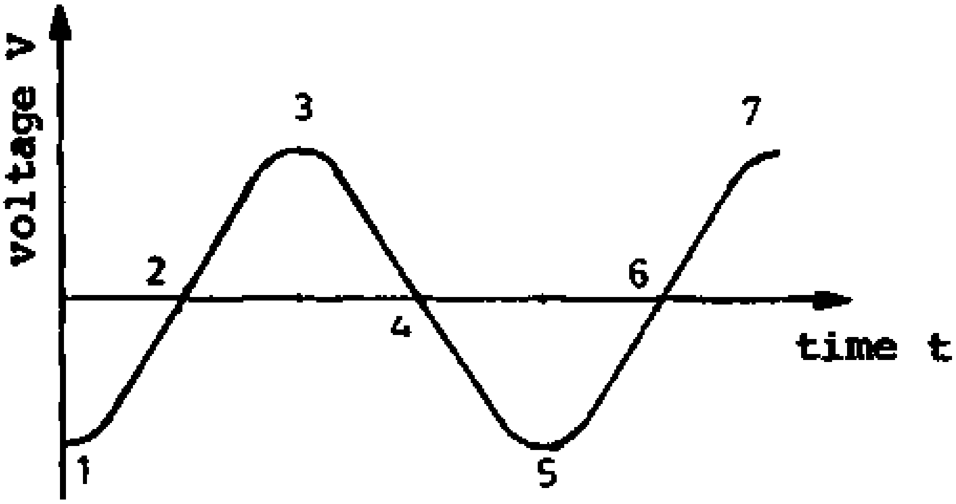
AC 1.2 The frequency of an alternating current is

1. the number of electrons passing through a point in 1 second.
2. the number of waves passing through a point in 1 second.
3. the speed with which the alternator runs.
4. the number of cycles generated in one minute.
5. half the number of peak values per second.

AC 1.3 The effective value of A.C. is obtained by multiplying

1. 0.707 by maximum value.
2. 0.707 by average value.
3. 0.636 by maximum value.
4. 0.636 by average value.
5. 0.707 by instantaneous value.

AC 1.4 The instantaneous values of A.C. are changing continuously. At which positions do the electrons change the direction of movement?

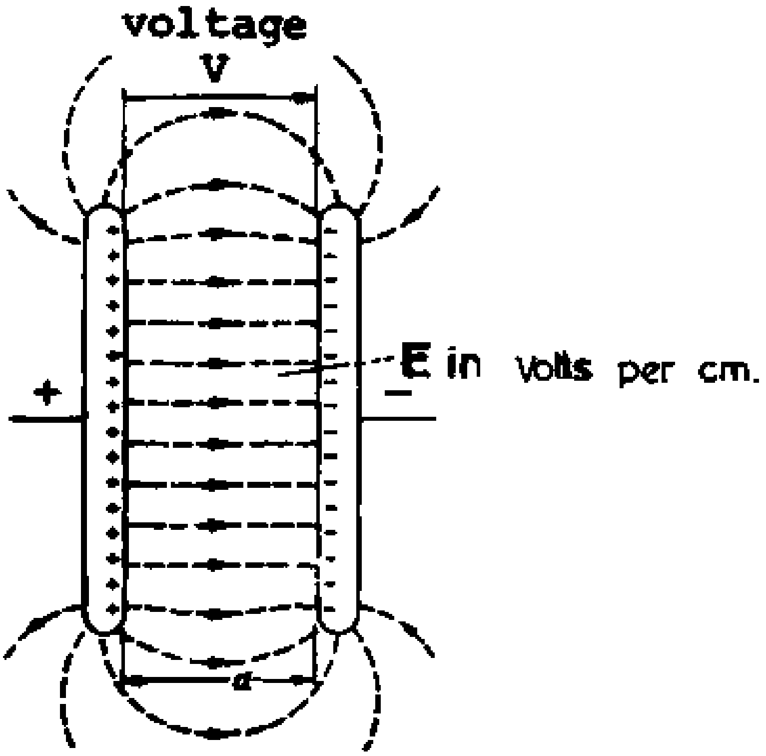


1. At 1 and 5.
2. At 2, 4 and 6.
3. At 3 and 7.
4. At 1, 3, 5 and 7.
5. At 2, 3, 4, 6 and 7.

AC 2.1 An alternating current or voltage is that which

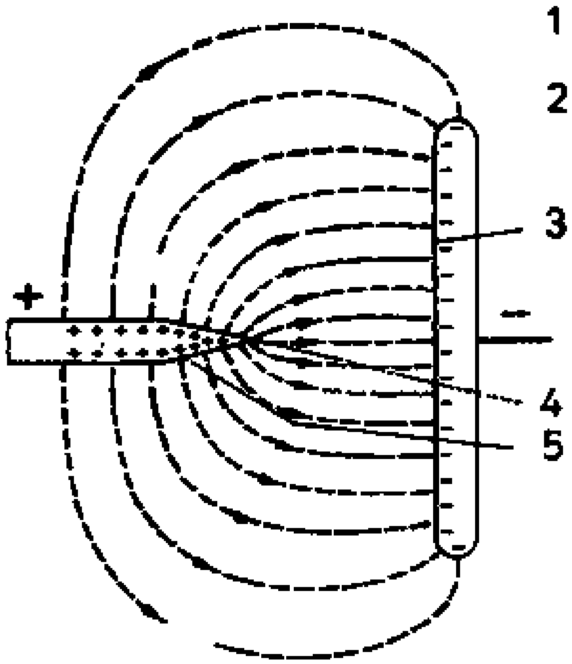
1. changes in direction only.
2. changes in magnitude only.
3. changes in both, magnitude and direction.
4. has a random movement of electrons.
5. has a periodical movement of neutrons.

AC 2.2 What is the relation between the field strength E, voltage V and the distance d between the parallel plates shown in the figure?



1. $E = \frac{V}{d}$
2. $E = V \times d$
3. $E = V \times d^2$
4. $E = \frac{V^2}{d}$
5. $E = \frac{V}{d^2}$

AC 2.3 At which point has the electric field shown in the figure the highest strength?



1. Point 1
2. Point 2
3. Point 3
4. Point 4
5. Point 5

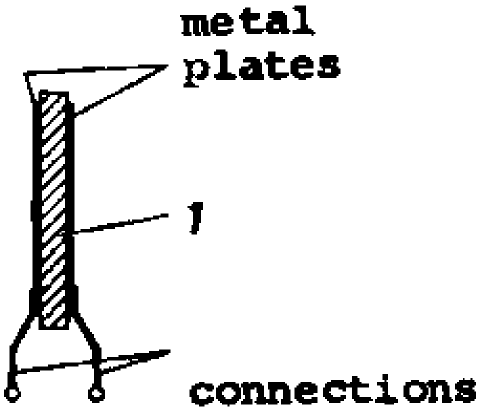
AC 3.1 How can one calculate the quantity of charge flowing through a conductor in time t when a current I flows through it?

1. $Q = I \times t$
2. $Q = \frac{I}{t}$
3. $Q = V \times I \times t$
4. $Q = \frac{V \times I}{t}$
5. $Q = I \times t^2$

AC 3.2 What is the unit of charge?

1. Volt−ampere (VA)
2. Henry (H)
3. Farad (P)
4. Coulomb (C)
5. Watt−second (Ws)

AC 3.3 The figure shows the construction of a capacitor. What is the layer marked 1 called?



1. Intermediate layer
2. Dielectric layer
3. Electrostatic layer
4. Charge separating layer
5. Capacitance plate

AC 3.4 If alternating voltage is applied across a pure inductive circuit and the frequency doubled then the current will

1. be doubled.
2. be halved.
3. not change.
4. be reduced to 1/4.
5. be 4 times as high.

AC 3.5 In an A.C. circuit containing inductance only

1. current leads voltage by 90°.
2. current lags behind voltage by 90°.
3. current and voltage are in phase.
4. current and voltage have a phase difference of less than 90
5. voltage leads current by half a cycle.

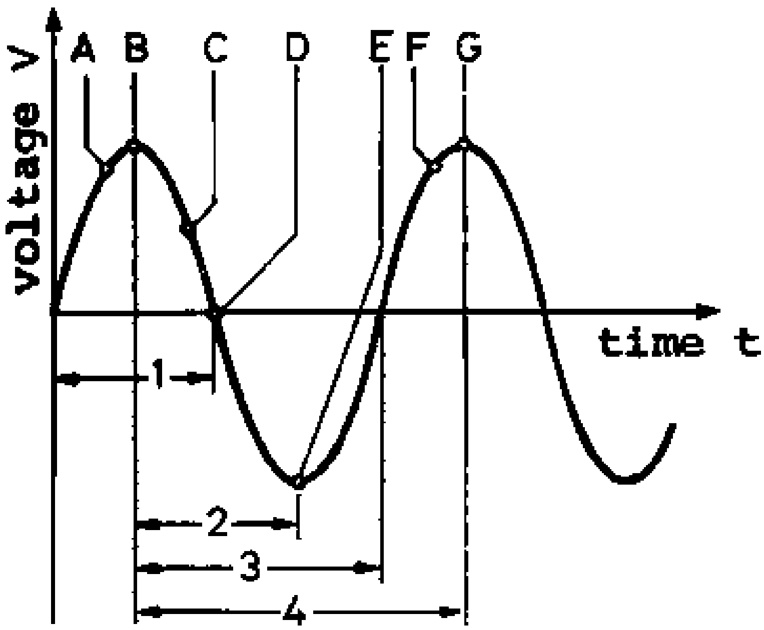
AC 4.1 In an electric circuit the lagging power factor is found to be 0.5. This might be a circuit with

1. parallel connection of ohmic and inductive resistances.
2. series connection of ohmic and inductive resistances.
3. pure ohmic resistances.
4. as much ohmic as inductive resistances.
5. pure inductive resistances.

AC 4.2 How will the total capacitance change, when two capacitors are connected in parallel?

1. The total capacitance increases.
2. The total capacitance decreases.
3. The mean value gives the new capacitance.
4. The total capacitance is found by reciprocal equation.
5. The total capacitance is equal to the difference of individual capacitances.

AC 4.3 Which of the points A....G represent a positive maximum value of alternating voltage?

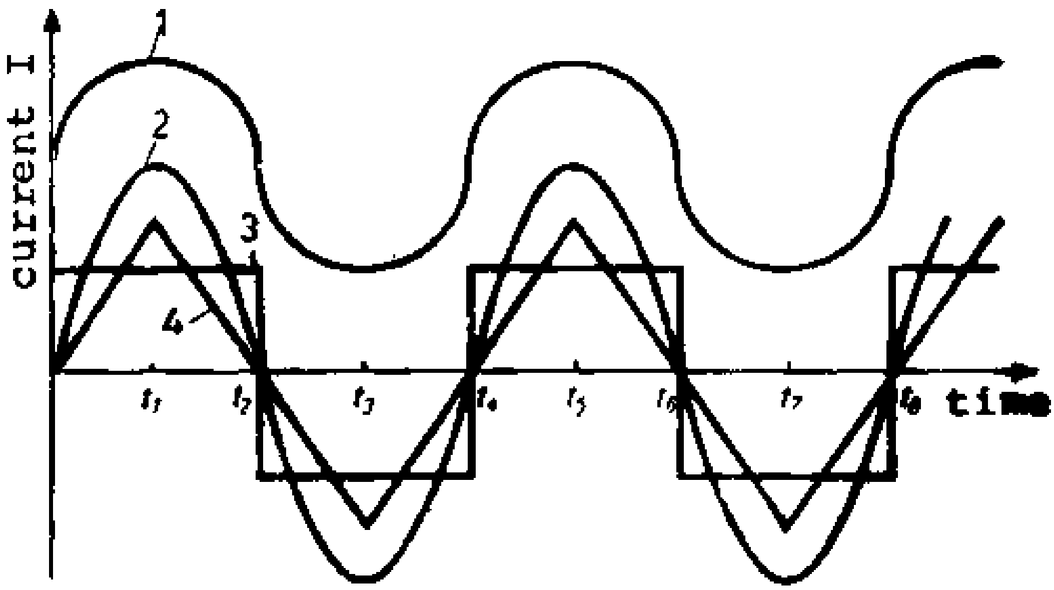


1. Only point B
2. The points B and G
3. Only point D
4. Only point E
5. The points A, B, C, E and G

AC 4.4 What is the unit of frequency?

1. Second (s)
2. Henry (H)
3. Hertz (Hz)
4. Minute (min)
5. Frequency is a ratio and has no unit.

AC 5.1 Four current curves are shown in the figure. Is there any curve which does not represent an alternating current?



1. Yes, curve 1
2. Yes, curve 2
3. Yes, curve 3
4. Yes, curve 4
5. No, all the curves represent an alternating current.

AC 5.2 At what times does the current represented by curve 4 in the above figure change its direction?

1. Only at times t_1 and t_5.
2. Only at times t_3 and t_7.
3. At times t_1, t_3, t_5 and t_7.
4. Only at times t_2 and t_6.
5. At times t_2, t_4, t_6 and t_8.

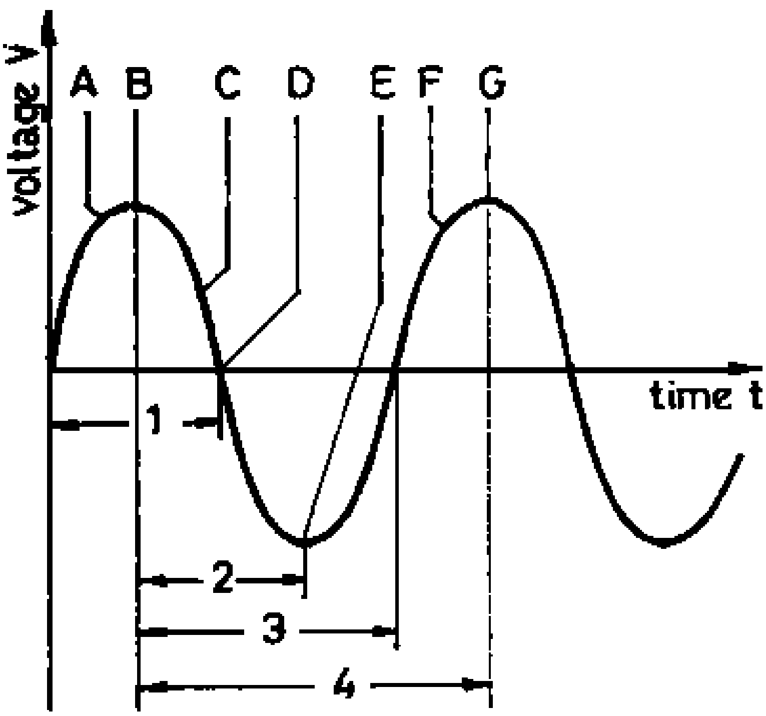
AC 5.3 What is meant by the time period T of an alternating current?

1. The time required to complete half a cycle.
2. The time required to complete one full cycle.
3. The no. of cycles completed in one second.
4. The time between two reversals of direction.
5. The time between the positive and negative voltage maximum of a sinusoidal alternating voltage.

AC 5.4 What is the relation between frequency and tine period?

1. $f = T$
2. $f = 1 - T$
3. $f = T - 1$
4. $f = \frac{1}{T}$
5. $f = \frac{T}{\pi}$

AC 6.1 What does point D indicate?



1. The maximum voltage.
2. The zero point transition voltage.
3. The voltage amplitude.
4. The maximum instantaneous value.
5. The peak value of voltage.

AC 6.2 Does any of the intervals 1....4 shown in the above figure represent the time period T?

1. Yes, interval 1.
2. Yes, interval 2.

3. Yes, interval 3.
4. Yes, interval 4
5. No, none of the intervals represents the time period T,

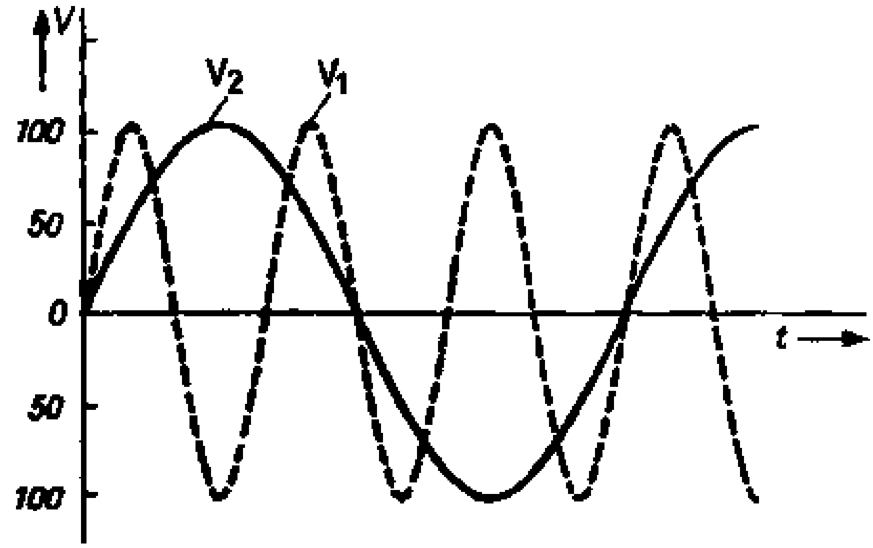
AC 6.3 What is meant by the frequency of an alternating voltage?

1. No. of full periods in one second.
2. No. of direction reversals in one second.
3. No. of direction reversals in one minute.
4. No. of half periods in one second.
5. The time required by an alternating voltage to complete one cycle.

AC 6.4 Which of the following symbols is false?

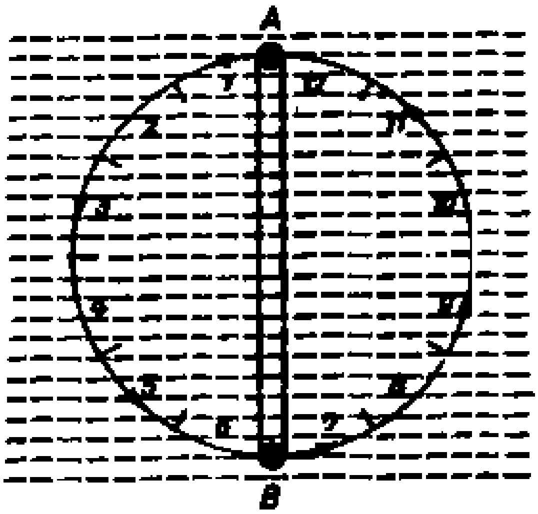
1. Frequency: f
2. Time period: T
3. Instantaneous value of current: i
4. Peak value of voltage: v
5. Instantaneous value of voltage: v

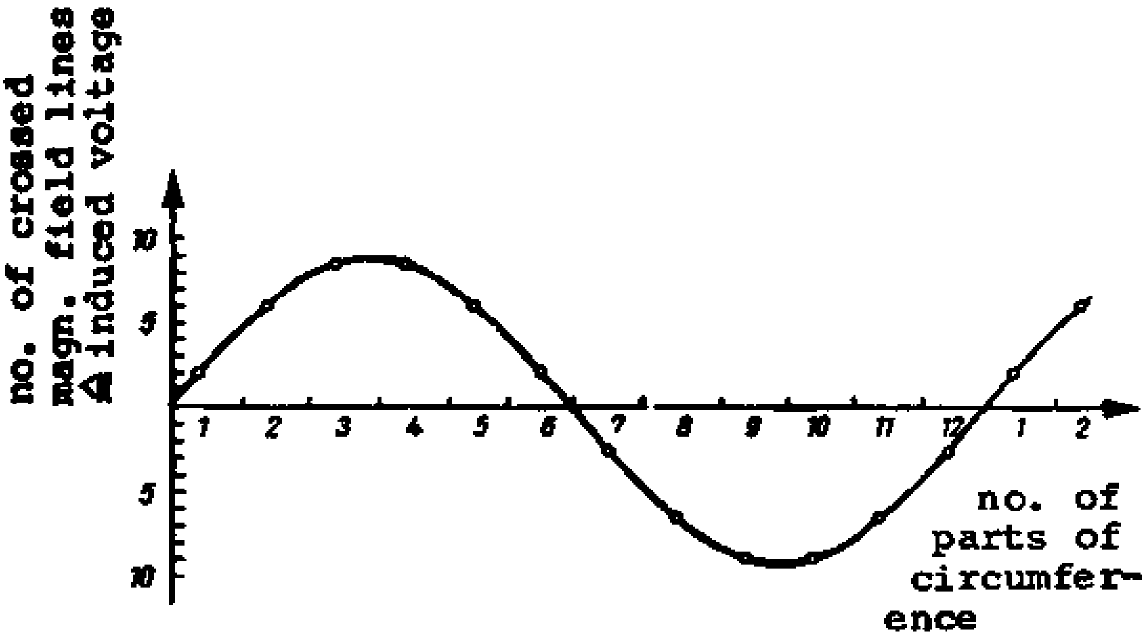
AC 7.1 Which of the following statements about the two voltages shown in the figure is true?



1. The peak value of voltage v_1 is greater than the peak value of voltage v_2.
2. The peak value of voltage v_1 is smaller than the peak value of voltage v_2.
3. The time period of voltage v_1 is higher than that of v_2.
4. The frequency of voltage v_1 is less than that of v.
5. The frequency of voltage v_1 is greater than that of v_2.

AC 7.2 How is the voltage shown in the figure described?





1. Circular alternating voltage.
2. Sinusoidal alternating voltage.
3. Pulsating alternating voltage.
4. Pulsating direct voltage.
5. Oscillatory voltage.

AC 8.1 What is the important advantage of using alternating voltage in electrical power engineering?

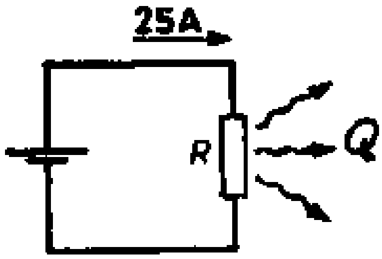
1. For alternating current less conductor cross−section is required as compared to D.C.
2. Less insulation is required in A.C.
3. A.C. motors are more easily controllable than D.C. motors.
4. Alternating voltages can be transformed.
5. In power stations A.C. can be produced with higher efficiency as compared to D.C.

AC 8.2 What is the relation between the effective value I and the peak value I_{max} of a sinusoidal alternating current?

1. $I = I_{max} \times \sqrt{2} = I_{max} \times 1.41$
2. $I = \frac{I_{max}}{0.637}$
3. $I = \frac{I_{max}}{\sqrt{2}} = 0.707 \times I_{max}$

4. $I = \frac{I_{max}}{\pi} = \frac{I_{max}}{3.14}$
5. $I = \frac{2I_{max}}{\pi} 0.637 I_{max}$

AC 8.3 A direct current of 25 A produces a specific quantity of heat Q per second in a resistance R. What should be the value of an alternating current to produce the same quantity of heat?



1. I_{max} = 25 A
2. I_{max} = 12.5 A
3. $I_{eff} = I = \frac{25\,A}{1.41} \approx 17.7\,A$
4. I_{eff} = I = 25 A × 0.637 ? 15.9 A
5. I_{eff} = I = 25 A

AC 9.1 Which of the following values of an alternating current is indicated by a normal universal measuring instrument (moving coil measuring system with rectifier)?

1. Effective value I
2. Arithmetical average value i_{av}
3. Peak value I_{max}
4. Half average value $\frac{i_{av}}{2}$
5. Half peak value $\frac{I_{max}}{2}$

AC 9.2 An alternating voltage of 220 V is given. Which of the values does this indicate?

1. The peak value v_{max}.
2. Half the peak value $\frac{v_{max}}{2}$.
3. The arithmetical average value v_{av}.
4. The effective value v.
5. Half the effective value $\frac{v}{2}$.

AC 9.3 According to which of the alternating current values is the cross−sectional area of a conductor with regard to the heating effect selected?

1. Effective value.
2. Arithmetical average value.
3. Peak value.
4. Half peak value.
5. Half the arithmetical average value.

AC 9.4 How is the ohmic resistance termed?

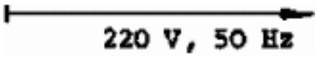
1. Inductive resistance.
2. Reactive resistance.

3. Effective resistance.
4. Apparent resistance.
5. Capacitive resistance.

AC 10.1 Which of the following values of alternating voltage should an insulation absolutely withstand?

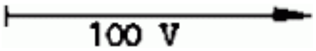
1. The effective value.
2. The arithmetical average value.
3. Half the effective value.
4. Half the arithmetical average value.
5. The peak value.

AC 10.2 How many rotations does the vector representing the alternating voltage make in one second?



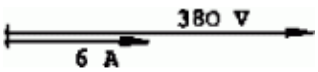
1. $\frac{50}{60}$ rotations per second.
2. 50 rotations per second.
3. 100 rotations per second.
4. 314 rotations per second.
5. It is not possible to make any statement.

AC 10.3 Which value of the voltage is normally represented by the length of a vector in a vector diagram?



1. The peak value.
2. The effective value.
3. The arithmetical average value.
4. Half the peak value.
5. Half the effective value.

AC 10.4 Voltage and current in a circuit are represented by vectors as shown in the figure. Which of the following statements is true about them?

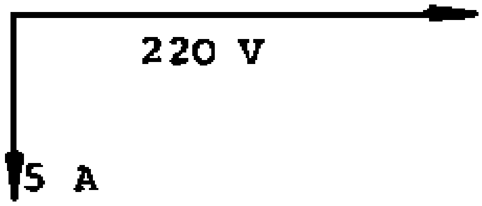


1. The current leads the voltage.
2. The voltage leads the current.
3. Current and voltage are in phase.
4. The current vector rotates at a higher speed than the voltage vector.
5. The voltage vector rotates at a higher speed than the current vector.

AC 11.1 What is meant by “current and voltage are in phase”?

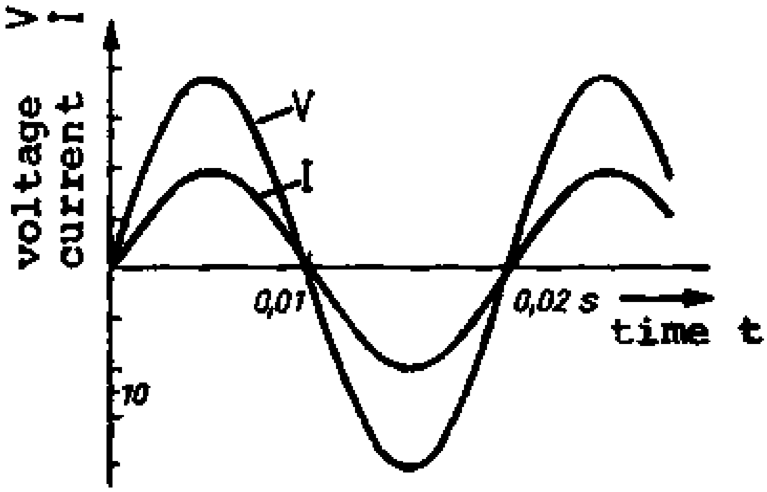
1. Voltage and current are of the same magnitude.
2. Voltage and current have the same frequency.
3. The voltage leads the current in time.
4. The voltage lags behind the current in time.
5. Voltage and current reach their maximum and zero value at the same time.

AC 11.2 Which of the following statements about the vector diagram shown in the figure is true?



1. The voltage lags behind the current by 90°.
2. The current leads the voltage by 90°.
3. The current lags behind the voltage by 90°.
4. Current and voltage are in phase.
5. The voltage vector rotates at a higher speed as compared to the current vector.

AC 11.3 Current and voltage of a circuit element are shown in the figure. What circuit element is used?

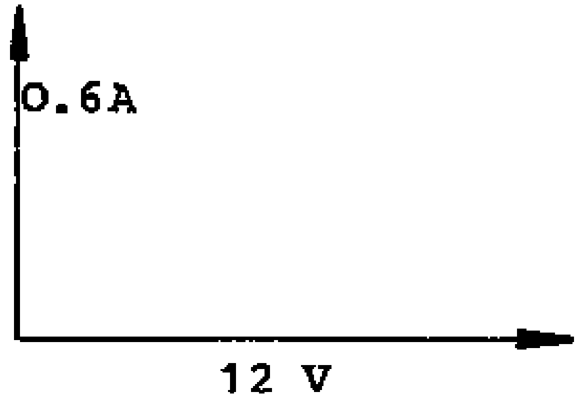


1. A capacitor.
2. A coil with very high inductance.
3. A coil with high inductance.
4. An ohmic resistance.
5. Resistor and capacitor connected in series.

AC 11.4 The phase difference is usually represented in terms of an angle. What is the phase angle ? when the peak values of voltage and current are displaced by a quarter period?

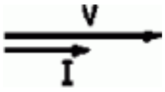
1. ? = 45°
2. ? = 60°
3. ? = 90°
4. ? = 120°
5. ? = 180°

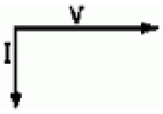
AC 12.1 Which of the following statements about the vector diagram shown in the figure is true?



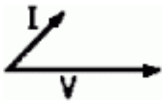
1. The voltage leads the current by 90°.
2. The voltage lags behind the current by 90°.
3. The current lags behind the voltage by 90°.
4. Current and voltage are in phase.
5. The current vector rotates at a higher speed than the voltage vector.

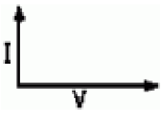
AC 12.2 Which of the following vector diagrams shows voltage and current in a resistance?

1. 

2. 

3. 

4. 

5. 

AC 12.3 Which of the following quantities influence the inductive reactance of a coil?

1. Only the number of turns of the coil.
2. Only the number of turns of the coil and the frequency of the alternating current.
3. Only the inductance of the coil.
4. Only the inductance of the coil and the frequency of the alternating current.
5. Only the inductance and resistance of the coil.

AC 13.1 Which of the following statements about the angular frequency is true?

1. The angular frequency is a mathematical quantity obtained by multiplying the frequency of alternating current by factor 2?.

2. The angular frequency is equal to the time period T.

3. The angular frequency is equal to the revolutions per minute of an A.C. generator.

4. The angular frequency is equal to the revolutions per second of an A.C. generator.

5. The angular frequency is another expression for frequency.

AC 13.2 What is the angular frequency of the usual alternating voltage having a frequency of 50 Hz?

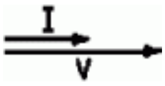
1. 3000/min
2. 50/s
3. 0.02 s
4. 314/s
5. 628/s

AC 13.3 Which of the following formulae for calculating the inductive reactance of a coil is correct?

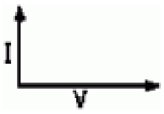
1. $X_L = \omega \times L$
2. $X_L = \frac{f}{2\pi} \times L$

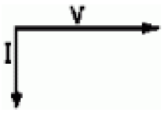
3. $X_L = f \times L$
4. $X_L = 2\pi f \times L^2$
5. $X_L = \frac{f \times L^2}{2}$

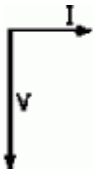
AC 13.4 Which of the following vector diagrams applies to a non−resistive coil, i.e. for a pure inductive reactance?

1. 

2. 

3. 

4. 

5. 

AC 14.1 Besides an inductive reactance a coil also has in practice a resistance. Which of the following statements is true about the phase difference between the voltage and the current in such a coil?

1. Voltage and current are in phase.
2. The current leads the voltage by a quarter period.
3. The current lags behind the voltage by a quarter period.
4. The current leads the voltage at an angle ? between 0° and 90°.
5. The current lags behind the voltage at an angle ? between 0° and 90°.

AC 14.2 True or effective power in a pure capacitive circuit is

1. always negative.
2. equal to half *of* the peak value.
3. zero.
4. equal to the peak value.
5. always positive.

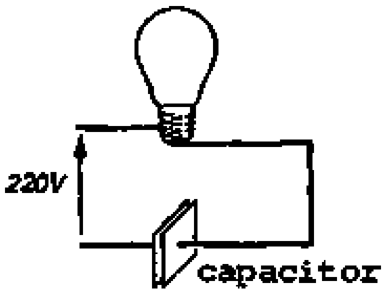
AC 14.3 A collapsing field around a coil

1. helps the decay of coil current.
2. tends to aid current flow reversal.
3. tends to oppose the decay of coil current.
4. does not affect the coil current flow.

AC 14.4 When a series combination of a resistor and a capacitor is connected to a source of D.C. voltage

1. it charges almost immediately.
2. it takes time to charge, depending upon the resistance value only.
3. it takes time to charge, depending upon the voltage applied.
4. it takes time to charge depending upon both the resistance and capacitance.
5. it takes time to charge depending upon the capacitance value only.

AC 15.1 Will the filament lamp shown in the figure glow constantly (not just for a short while)?

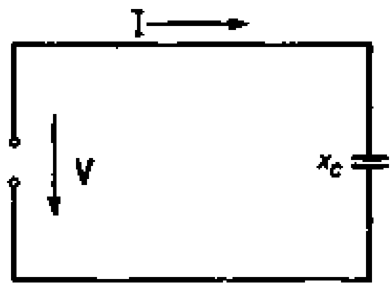


1. No, because the dielectrica prevents the current flow.
2. Yes, if the voltage source supplies an alternating voltage and the capacitor is small.
3. Yes, if the voltage source supplies a direct voltage and the capacitor is small.
4. Yes, if the voltage source supplies an alternating voltage and the capacitor is large.
5. Yes, if the voltage source supplies a direct voltage and the capacitor is large.

AC 15.2 Which of the following formulae can be used for the calculation of a capacitive reactance?

1. $x_C = \frac{1}{2\pi f \times C}$
2. $x_C = 2\pi f \times C$
3. $x_C = f \times C$
4. $x_C = \frac{1}{f \times C}$
5. $x_C = f \times C^2$

AC 15.3 Which of the following formulae gives the effective value of current I in the circuit shown in the figure?



1. $I = V \times x_C$
2. $I = \frac{V}{x_C}$
3. $I = \frac{1}{V \times x_C}$
4. $I = \frac{x_C}{V}$
5. $I = \frac{V^2}{x_C}$

AC 15.4 Which of the following statements is true? In an ideal capacitor

1. the current leads the voltage by 90°.
2. the current lags behind the voltage by 90°.
3. current and voltage are in phase.
4. the current leads the voltage at an angle ? between 0° and 90°

5. the current lags behind the voltage at an angled ? between 0° and 90°.

AC 16.1 0.01 Farad is the same as

1. 10 ?F
2. 100 ?F
3. 1 000 ?F
4. 10 000 ?F
5. 1 ?F

AC 16.2 While connecting capacitors in a circuit with which of the following types must you be careful about the correct polarity?

1. Paper capacitor
2. Mica capacitor
3. Ceramic capacitor
4. Variable capacitor
5. Electrolytic capacitor

AC 16.3 Power in a pure inductive circuit is equal to

1. half of the peak value.
2. double the peak value.
3. zero.
4. peak value.
5. average of positive value

AC 16.4 Which formula do you use to calculate impedance of a circuit containing resistance and capacitance in series?

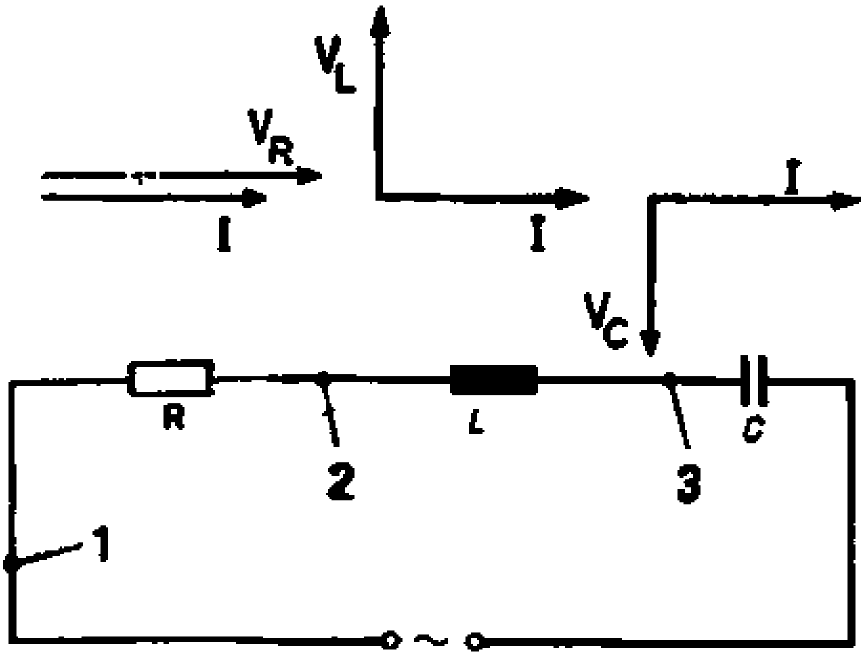
1. $z = R + x_C$
2. $z = R - x_C$
3. $z = R^2 + x_C^2$
4. $z = \sqrt{R^2 + x_C^2}$
5. $z = \sqrt{R^2 - x_C^2}$

AC 16.5 In a pure capacitive circuit, if the supply frequency is reduced to 1/4, the current will

1. be reduced by half.
2. be doubled.
3. be four times as high.
4. be reduced to 1/4.
5. not be affected.

AC 16.6 How is the resistance of a capacitor in an A.C. circuit termed?

1. Capacitor resistance
2. Apparent resistance
3. Effective resistance
4. Capacitive reactance
5. Capacitive effective resistance



AC 17.1 The above figure shows a circuit consisting of R, L and C. Which of the following statements is true?

1. The current has different effective values at points 1, 2 and 3.
2. The current has the same effective value at points 1, 2 and 3 but the phase angle is different.
3. The current has different instantaneous values at points 1, 2 and 3.
4. The current has the same instantaneous value at all points of the circuit.
5. The instantaneous value of the current is the sane at all points of the circuit if the capacitive reactance is equal to the inductive reactance.

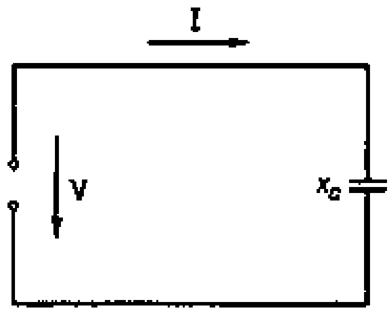
AC 17.2 Which of the following statements about the vector diagrams shown in the above figure is true?

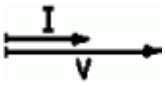
1. Only the vector diagram for the resistance is wrong.
2. Only the vector diagram for the inductive reactance is wrong.
3. Only the vector diagram for the capacitive reactance is wrong.
4. The vector diagrams for the inductive and capacitive reactances are wrong.
5. All the vector diagrams are correct.

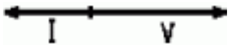
AC 17.3 Which of the following relations is true for power factor?

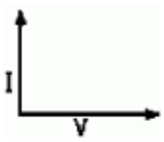
1. $\cos\varphi = \frac{P}{P_a}$
2. $\cos\varphi = \frac{P_a}{P}$
3. $\cos\varphi = \frac{P_r}{P}$
4. $\cos\varphi = \frac{P}{P_r}$
5. $\cos\varphi = \frac{P_r}{P_a}$

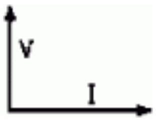
AC 18.1 Which of the following vector diagrams is correct for the circuit shown in the figure?

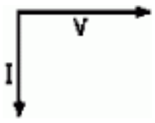


1. 

2. 

3. 

4. 

5. 

AC 18.2 By adding more resistance to an RC circuit

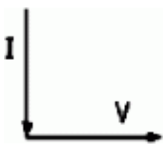
1. the true power increases.
2. the true power decreases.
3. the power factor decreases.
4. the angle of phase difference increases.
5. the negative power increases.

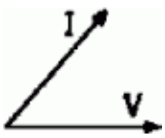
AC 18.3 When alternating voltage is applied across a pure capacitive circuit

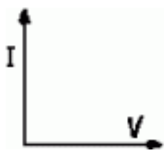
1. the current lags behind the voltage by 90°.
2. the current leads the voltage by a quarter cycle.
3. current and voltage are in phase.
4. the voltage lags behind the current by half a cycle.
5. the voltage leads the current by half a cycle.

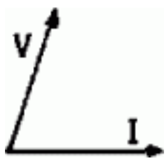
AC 18.4 Which of the following vector diagrams is correct for a mixed capacitive circuit?

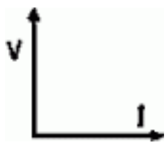
1 2 3 4 5









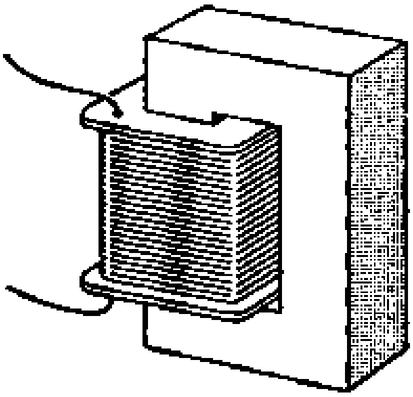


AC 19.1 Which of the following statements about the influence of frequency on resistances in an A.C. circuit is true?

1. An ohmic resistance increases with increasing frequency.
2. An ohmic resistance decreases with increasing frequency.
3. The inductive reactance of a coil decreases with increasing frequency.

4. The capacitive reactance of a capacitor decreases with increasing frequency.
5. The capacitive reactance of a capacitor increases with increasing frequency.

AC 19.2 How can the apparent resistance of the coil shown in the figure be determined by measurement?



1. The resistance measured with the help of a Wheatstone bridge is equal to the apparent resistance of the coil.

2. A direct current is passed through the coil, current and voltage are measured and Z is calculated by using ohm's law.

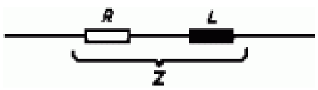
3. An alternating current of corresponding frequency is passed through the coil, current and voltage are measured and Z is calculated by using ohm's law.

4. The inductance of the coil is measured by using an appropriate measuring bridge.

AC 19.3 Which of the following formulae is generally used to calculate the impedance?

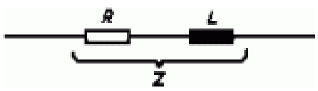
1. $Z = \sqrt{R^2 + X^2}$
2. $Z = R^2 + X^2$
3. $Z = R + X$
4. $Z = R - X$
5. $Z = \sqrt{R^2 - X^2}$

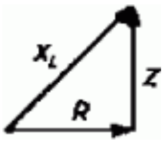
AC 20.1 What is the formula to calculate the impedance 2 of a series circuit consisting of a resistance and an inductance?

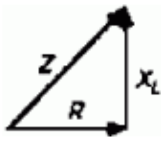


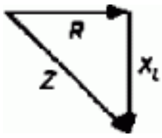
1. $Z = R + X_L$
2. $Z = R^2 + X_L{}^2$
3. $Z = \sqrt{R^2 + X_L^2}$
4. $Z = R^2 - L^2$
5. $Z = \sqrt{R^2 - L^2}$

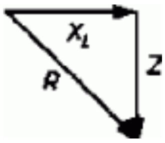
AC 20.2 Which of the following vector diagrams gives the correct relation between the impedance Z, the resistance R and the reactive inductance X_L?

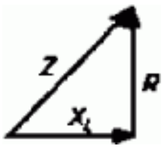


1. 

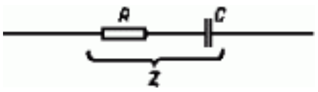
2. 

3. 

4. 

5. 

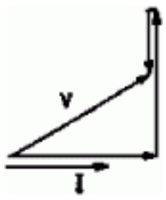
AC 20.3 Which is the correct formula to calculate the impedance of a series circuit consisting of a resistance and a capacitive reactance?

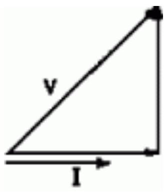


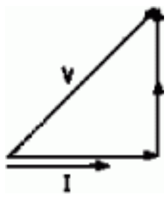
1. $Z = \sqrt{R^2 + X_C^2}$
2. $Z = R + X_C$
3. $Z = R - X_C$
4. $Z = \sqrt{R^2 - X_C^2}$
5. $Z = R^2 - X_C^2$

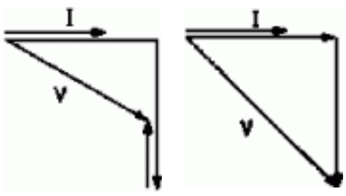
AC 20.4 What is ohm's law in the general form also valid for A.C.?

1. $I = V \times Z$
2. $I = \frac{V}{Z}$
3. $I = \frac{V}{R + X}$
4. $I = \frac{V}{R^2 + X^2}$
5. $I = V \times X$



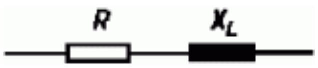






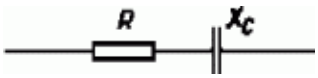
1 2 3 4 5

AC 21.1 Which of the above figures represents the correct vector diagram of the circuit shown?



1. Figure 1
2. Figure 2
3. Figure 3
4. Figure 4
5. Figure 5

AC 21.2 Which of the above figures represents the correct vector diagram of the circuit shown?

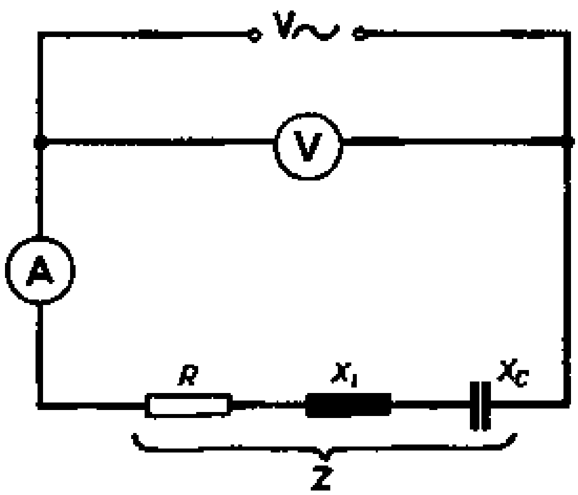


1. Figure 1
2. Figure 2
3. Figure 3
4. Figure 4
5. Figure 5

AC 21.3 A resistance is connected in series with a coil. Which of the following statements is true?

1. The phase difference between current **I** and voltage V_L increases.
2. The phase difference between current **I** and voltage V_L decreases.
3. The phase difference between current **I** and voltage V decreases.
4. The phase difference between current **I** and voltage V increases.
5. Current **I** increases

AC 22.1 When is the impedance Z of the circuit shown in the figure smallest?



1. When $R = X_L$
2. When $R = X_C$
3. When $X_L = X_C$
4. when the frequency f is very low.
5. When the frequency f is very high.

AC 22.2 By changing the frequency the impedance Z in the above figure attains its lowest value. How is this state called?

1. Oscillatory state
2. Series resonance
3. Parallel resonance
4. Angular resonance
5. Frequency resonance

AC 22.3 How is it indicated that the circuit shown in the above figure is in resonance?

1. The current I attains its minimum value.
2. The current I attains its maximum value.
3. The current I remains constant over a wide range of frequency.
4. The current I becomes zero.
5. The voltage V becomes zero.

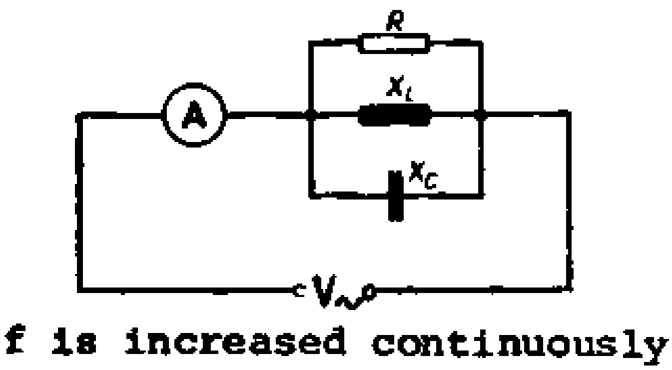
AC 22.4 How high is the current in the circuit shown above in case of resonance?

1. The current is theoretically infinite.
2. The current is zero.
3. The current can be calculated with the help of the formula $I = \frac{V}{X_L}$
4. The current can be calculated with the help of the formula $I = \frac{V}{X_C}$
5. The current can be calculated with the help of the formula $I = \frac{V}{R}$

AC 23.1 Which point is to be kept in mind with series resonance?

1. The current can increase infinitely.
2. The voltage at the resistance R can become much larger than the applied voltage.
3. The voltage at the capacitor and at the coil can become much larger than the applied voltage.
4. The current is practically zero.
5. The voltage at the coil and at the capacitor is practically zero.

AC 23.2 What is the state termed when as shown in the circuit, $X_L = X_C$?



1. Parallel resonance
2. Frequency resonance
3. Series resonance
4. Angular resonance

AC 23.3 In the above shown circuit the frequency of the applied voltage is increased continuously. How is it indicated that the resonance frequency has been reached?

1. The current I attains its highest value.
2. The current I attains its lowest value.

3. The applied voltage increases very much.
4. The applied voltage decreases.
5. The applied voltage becomes practically zero.

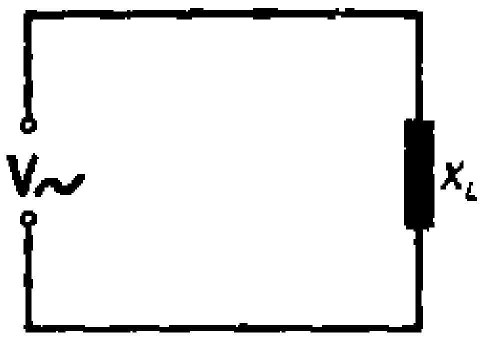
AC 23.4 Which point is to be kept in mind with parallel resonance?

1. A very high voltage appears across the coil.
2. A very high voltage appears across the capacitor.
3. A very high voltage appears across the parallel combination of coil and capacitor.
4. Although the current in the leads is small, the current passing through X_L and X_C is very high.
5. The circuit represents a short circuit, the total current is very high.

AC 24.1 An alternating current flows through an ohmic resistance. What is the electrical power converted into heat in the resistance called?

1. Heating power
2. Reactive power
3. Transformation power
4. Apparent power
5. True power

AC 24.2 An alternating voltage V is applied across an inductive reactance (non−ohmic). A current I flows through it. What does the product of voltage and current represent?

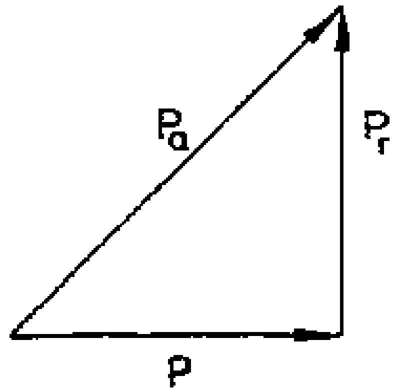


1. A true power
2. An inductive reactive power
3. A capacitive reactive power
4. A resistive power
5. A heating power

AC 24.3 A coil has an inductive reactance X_L and an effective resistance R. When an alternating voltage V is applied across it, a current I flows through it. What is the product of V and I called?

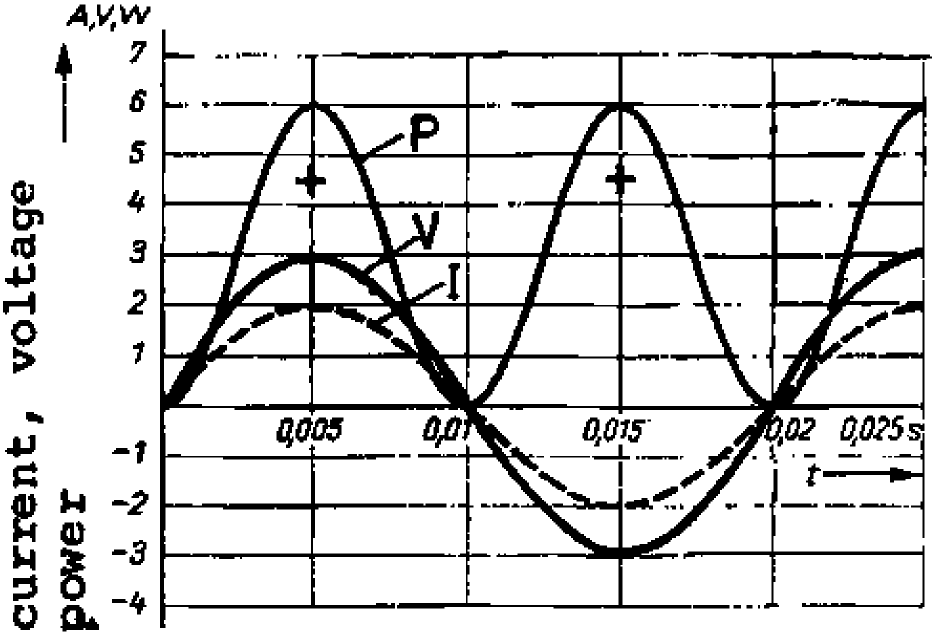
1. Inductive reactive power
2. Apparent power.
3. True power
4. Capacitive reactive power
5. Magnetisation power

AC 24.4 Can the angle of phase difference ? be taken from the power triangle?



1. Yes, it is the angle between P and P_a.
2. Yes, it is the angle between P_a and P_r.
3. Yes, it is the angle between P and P_r.
4. Yes, it is the sum of the angles between P_a and P, and P_a and P_r.
5. No, the phase angle cannot be taken from the power triangle.

AC 25.1 The voltage −, current − and power curves for a consumer are shown in the figure. What type of consumer is it?



1. A capacitor
2. A non−resistive coil
3. A coil having a resistance
4. A pure resistance
5. A capacitor connected in series with a resistance

AC 25.2 Which form of power is represented by the power curve shown in the figure?

1. True power
2. Inductive reactive power
3. Capacitive reactive power
4. Apparent power
5. D.C. power

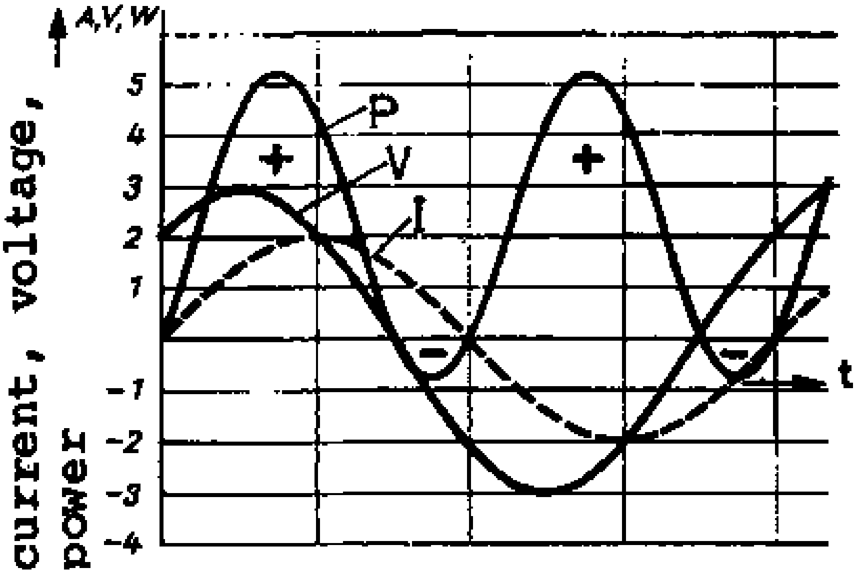
AC 25.4 What is the frequency of the power shown in the figure above?

1. $\frac{1}{4}$ of the frequency of the voltage and current.
2. Half the frequency of the voltage and current.
3. Same frequency as that of the voltage and current.
4. Double the frequency of the voltage and current.
5. Four times the frequency of the voltage and current.

AC 25.4 What is the true power drawn by a consumer when the voltage V, the current I and the phase angle ? between them are known?

1. $P = V \times I$
2. $P = V \times I \times \cos$?
3. $P = V \times I \times \sin$?
4. $P = \frac{V \times I}{\cos\varphi}$
5. $P = \frac{V \times I}{\sin\varphi}$

AC 26.1 The voltage–, current– and power curves for a consumer are shown in the figure. What type of consumer is it?



1. An ohmic resistance
2. A capacitance
3. A capacitance, connected in series with an ohmic resistance
4. An inductive reactance
5. A coil with an ohmic resistance

AC 26.2 The voltage–, current– and power curves for a consumer are shown in the above figure. What type of power is represented by the curve?

1. True power
2. Inductive reactive power
3. Capacitive reactive power
4. Apparent power
5. Magnetising power

AC 26.3 If the terminal voltage V, the current I and the phase angle ? are known, how is the apparent power of a single phase transformer calculated?

1. $P_a = V \times I$
2. $P_a = V \times I \times \sin$?

3. $P_a = \frac{V \times I}{\sin\varphi}$
4. P_a = V × I × cos?
5. $P_a = \frac{V \times I}{\cos\varphi}$

AC 26.4 What is the relation between the true power P, the reactive power P_r and the apparent power P_a?

1. $P_a = P + P_r$
2. $P_a = P - P_r$
3. $P_a^2 = P^2 - P_r^2$
4. $P_a^2 = P^2 + P_r^2$
5. $P_a = \sqrt{P^2 + P_r^2}$

AC 27.1 Which of the following powers is shown on the name plate of a transformer?

1. The true power which it can supply.
2. The true power drawn by the transformer.
3. The apparent power which it can supply.
4. The apparent power drawn by the transformer.
5. The reactive power supplied by it.

AC 27.2 How can the apparent power drawn by a consumer be determined?

1. By using an apparent power meter.

2. By using a watt meter which directly indicates the apparent power.

3. By using a watt meter and a power factor meter. Their readings have to be multiplied to get the apparent power.

4. By measuring the voltage V and the current I. The values have to be multiplied to get the apparent power.

5. By measuring the voltage V, the current I and the power factor cos?. The values have to be multiplied to get the apparent power.

AC 27.3 How can the true power P drawn by a consumer be measured?

1. The voltage V and the current I are measured and their product is calculated.

2. The voltage V, the current I and the power factor cos? are measured and the true power is calculated according to the formula

$$P = \frac{V \times I}{\cos\varphi}$$

3. The true power is measured directly with the help of a watt meter.

4. The reactive power is measured and the true power is calculated from it.

AC 28.1 Which power is measured with the help of an induction watt meter?

1. The apparent power.
2. The reactive power.
3. The true power and the reactive power.
4. Only the true power.
5. The reactive and apparent power.

AC 28.2 Which of the following consumers draws also inductive reactive power?

1. An electrical heater.
2. A filament lamp.
3. An electrolysis system which draws the current via transformers and rectifiers.
4. A D.C. motor which is connected to the mains via semiconductor diodes.
5. A three phase induction motor.

AC 28.3 Across what type of voltage can the capacitor shown in the figure be connected?

1. Only across a constant direct voltage.
2. Across a constant and pulsating direct voltage.
3. Only across an alternating voltage.
4. Across an alternating voltage and a constant direct voltage.
5. Across an alternating voltage and a pulsating direct voltage.

AC 29.1 Which of the following comparisons between the metallic paper (MP) capacitor and the electrolytic capacitor is true?

1. The MP capacitor cures itself after any puncture, which the electrolytic capacitor does not.

2. For the same volume the MP−capacitor can have much more capacitance as compared to the electrolytic capacitor.

3. MP capacitors are only suitable for direct voltage, while unpoled electrolytic capacitors can be used for alternating as well as for direct voltage.

4. A small rest current always flows through the dielectric of an MP capacitor, which is not the case with an electrolytic capacitor.

5. Electrolytic capacitors can be used for a surrounding temperature upto 200°C, while MP capacitors can be used only for a surrounding temperature upto 50°C.

AC 29.2 How should capacitors be discharged?

1. Through a resistor.
2. Through a good conductor (at least 4 mm^2 Cu).
3. First one pole of the capacitor is earthed, then the capacitor is short−circuited.
4. First both poles of the capacitor are earthed and then the capacitor is short−circuited.
5. It is not necessary to discharge capacitors if one waits for 5 seconds, because all capacitors discharge themselves after this interval.

AC 29.3 Which of the following capacitors is only suitable for direct voltage?

1. MP capacitor
2. Aluminium foil capacitor

3. Poled aluminium−electrolyte capacitor
4. Unpoled aluminium−electrolyte capacitor
5. Metal enamel capacitor

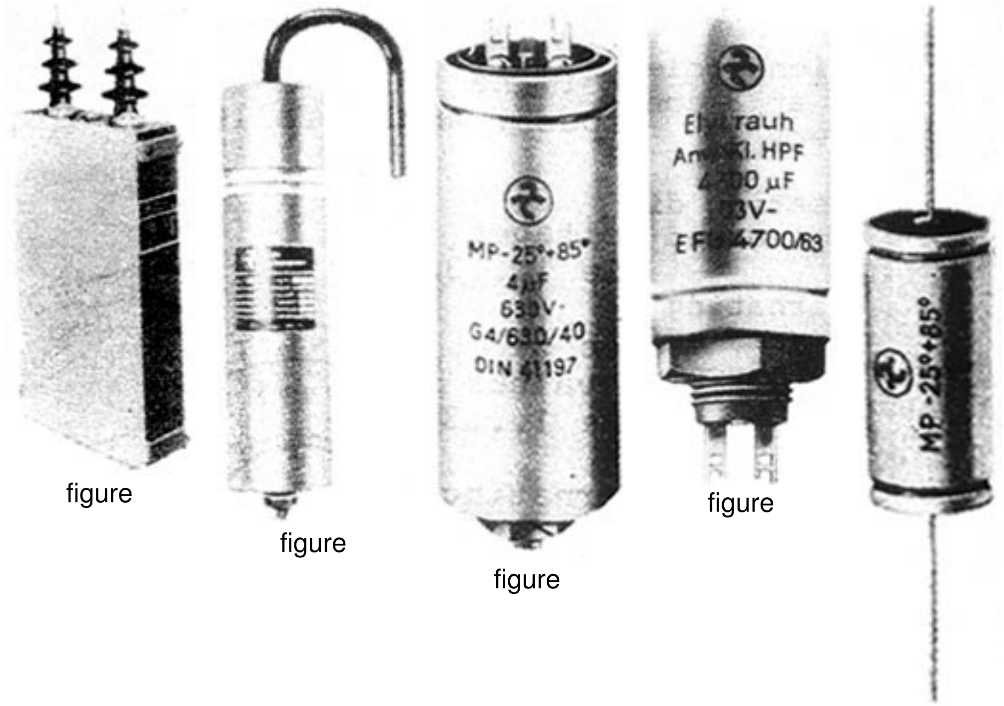
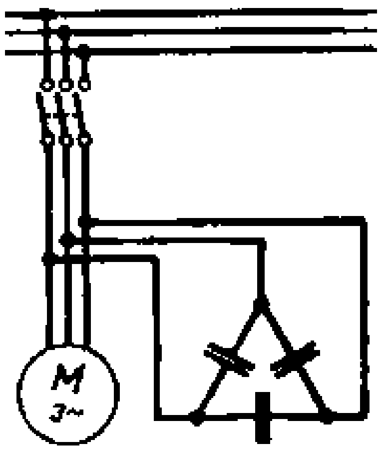


figure figure figure figure figure

1 2 3 4 5

AC 30.1 Which of the above shown capacitors can be used as a compensation capacitor for an induction motor in the circuit shown?

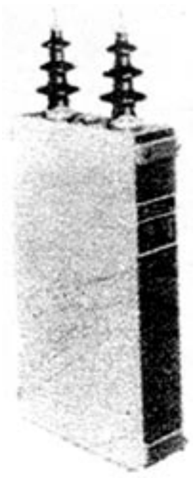


1. Figure 1
2. Figure 2
3. Figure 3
4. Figure 4
5. Figure 5

AC 30.2 What is the special use of the capacitor shown in figure 2 above?

1. Compensation of the reactive current of an induction motor.
2. Compensation of the reactive current of a fluorescent lamp.
3. Smoothing of the D.C. output of a bridge rectifier circuit.
4. Storing of energy for an electric flash gun.
5. Elimination of radio interference in an universal motor.

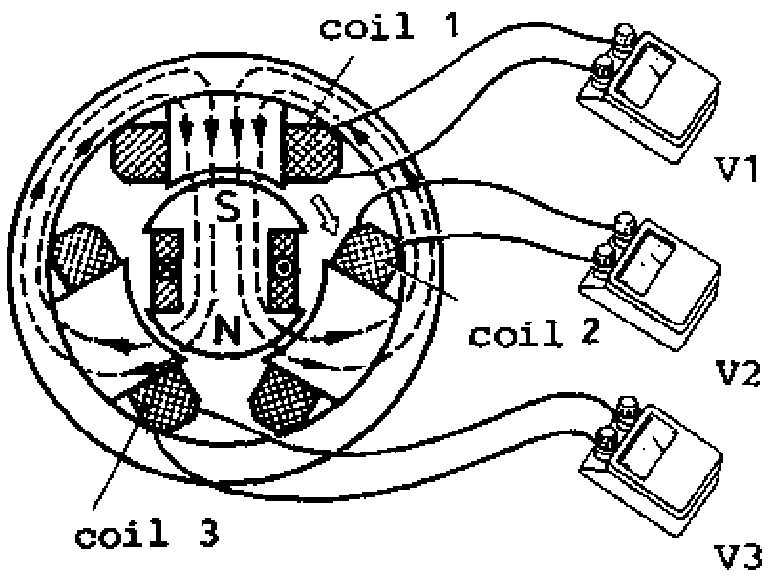
AC 30.3 What is the use of the capacitor shown in the figure?



1. For radio interference elimination in case of large induction motors.
2. Starter capacitor for high voltage induction motors.
3. For smoothing rectified low voltage.
4. Compensation capacitor for induction motors.
5. For reactive power compensation in medium voltage circuits.

Three Ph. Current

TC 1.1 The salient pole rotor of the generator shown in the figure rotates at a constant speed. Which of the following statements is correct?

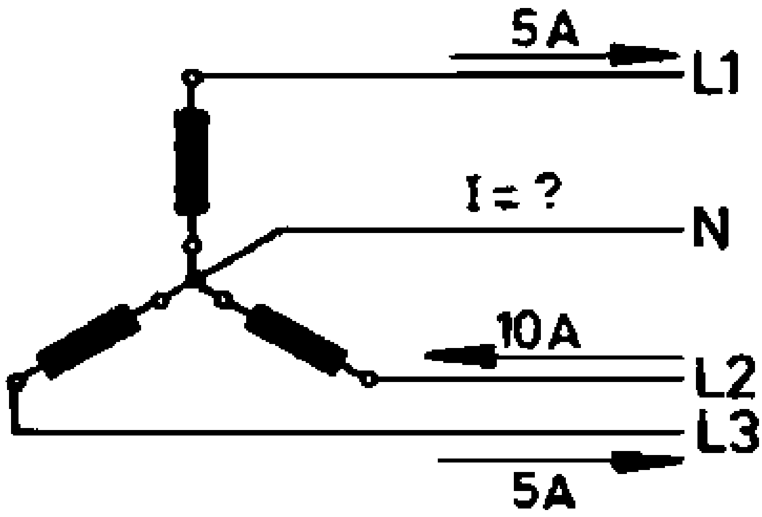


1. Pulsating direct voltages are induced in coils 1...3.
2. Alternating voltages of the same effective values are induced in coils 1... 3.
3. In coils 1...3 alternating voltages are induced, which attain their peak values simultaneously.
4. In coils 1... 3 alternating voltages are induced, which have the same instantaneous value at all times.

TC 1.2 To get 230 V from a three phase 20 000/400 V supply transformer, the three windings of its secondary side should be connected in

1. delta.
2. parallel.
3. star.
4. series.

TC 1.3 What amount of current is flowing through the neutral?

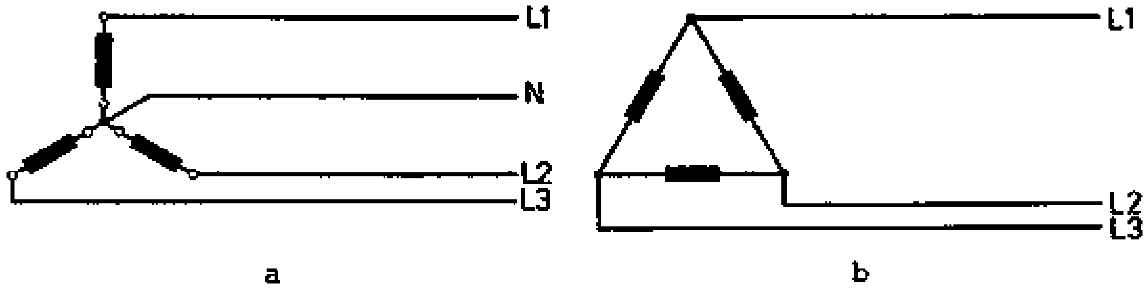


1. 5 A
2. 10 A
3. 15 A
4. 20 A
5. No current

TC 1.4 On no load an induction motor runs at the speed of 1500 rpm at a frequency of 50 hz. How many poles has this induction motor?

1. 2 poles
2. 4 poles
3. 6 poles
4. 8 poles
5. 10 poles

TC 2.1 What are the circuits shown in figures a and b called?



1. a: Star circuit
   b: Delta circuit

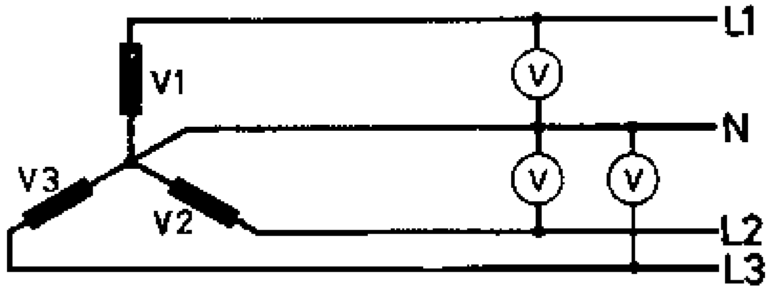
2. a: Star point circuit
   b: Delta circuit

3. a: Open circuit
   b: Interlinked circuit

4. a: Star circuit
   b: Interlined circuit

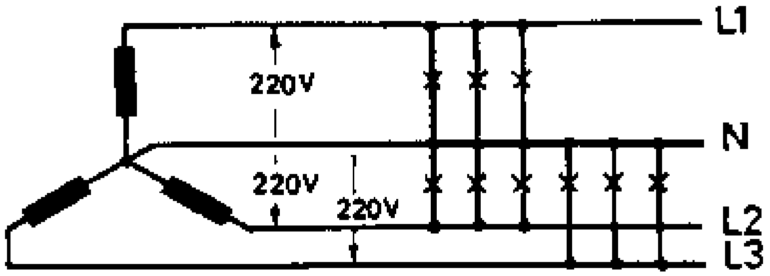
5. a: Voltage circuit
   b: Current circuit

TC 2.2 The figure shows a circuit diagram of a three phase generator. In each of the three coils an alternating voltage having an effective value of 220 V is induced. Which of the following Values is indicated by the voltmeters?



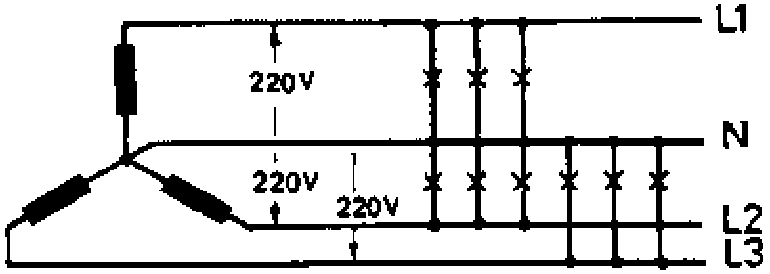
1. $220V \times \sqrt{3} = 380V$
2. 220 V
3. $\frac{220V}{\sqrt{3}} = 127V$
4. $220V \times \sqrt{2} = 310V$
5. $\frac{220V}{\sqrt{2}} = 156V$

TC 2.3 The same number of lamps are connected between the conductors L_1 and N, L_2 and N, and L_3 and N. What is this type of load called?



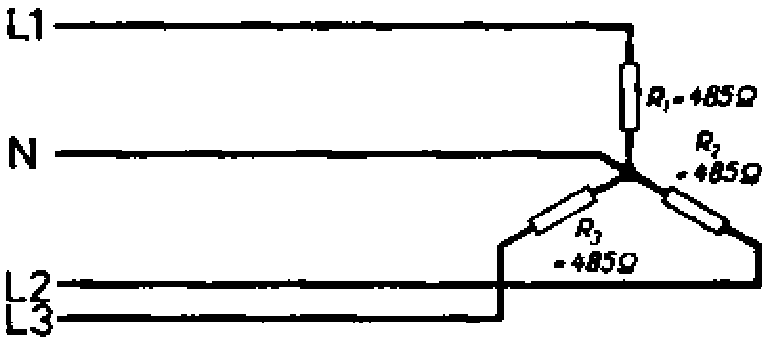
1. A co−phasal load
2. A unit load
3. A parallel load
4. A balanced load
5. A three conductor load

TC 3.1 What is the voltage appearing across each lamp?



1. $220V \times \sqrt{3} = 380V$
2. 220 V
3. $\frac{220V}{\sqrt{3}} = 127V$
4. $220V \times \sqrt{2} = 310V$
5. $\frac{220V}{\sqrt{2}} = 150V$

TC 3.2 Which current occurs in the neutral conductor?

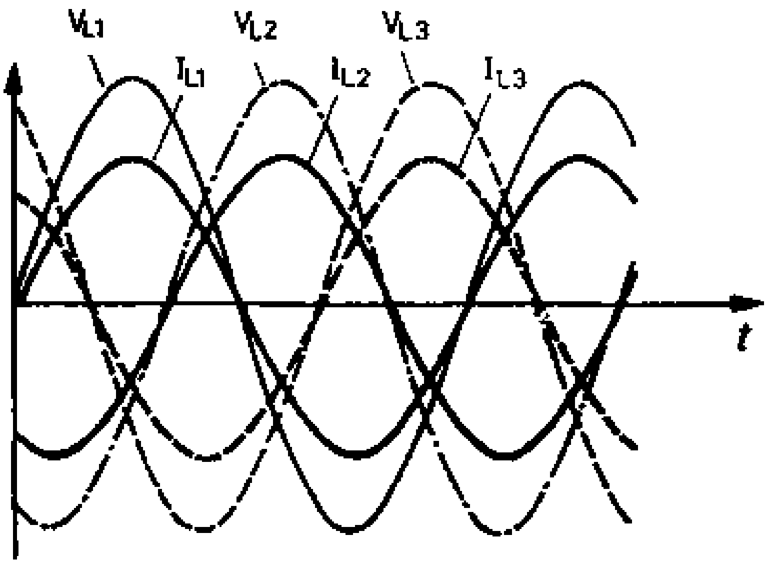


1. $I_N = 0$
2. $I_N = \frac{220V}{485\Omega} = 0.45A$
3. $I_N = \frac{380V}{485\Omega} = 0.78A$
4. $I_N = \frac{127V}{485\Omega} = 0.26A$
5. $I_N = \frac{380V}{2 \times 485\Omega} = 0.39A$

TC 3.3 Which of the following equations is valid for a balanced load on a star circuit with a neutral conductor (four wire star circuit)?

1. $I_N = I_{L1} - I_{L2} + I_{L3}$
2. $I_N = I_{L1} + I_{L2} - I_{L3}$
3. $I_N = I_{L1} + I_{L2} + I_{L3} = 0$
4. $I_N = \frac{V_{L1} + V_{L2} + V_{L3}}{R}$
5. $I_N = \frac{V_{L1} + V_{L2} + V_{L3}}{3 \times R}$

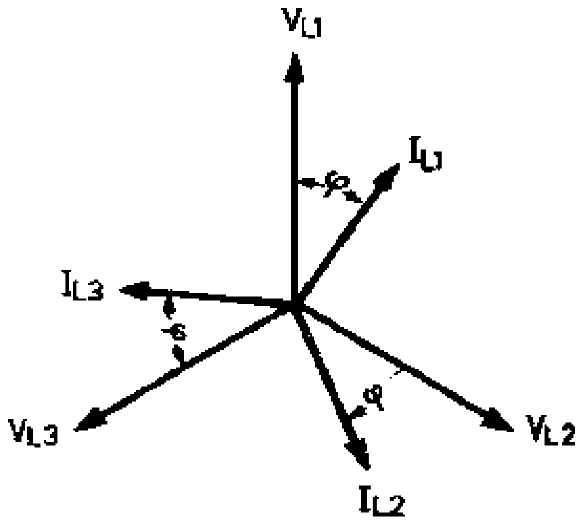
TC 4.1 The figure shows the voltage and current curves for a three phase consumer. Which type of consumer is it?



1. A three phase motor.
2. A three phase coil with a very small ohmic resistance.
3. Capacitors in star connection.

4. A three phase coil with normal ohmic resistance.
5. Star−connected heating resistances of an electric oven.

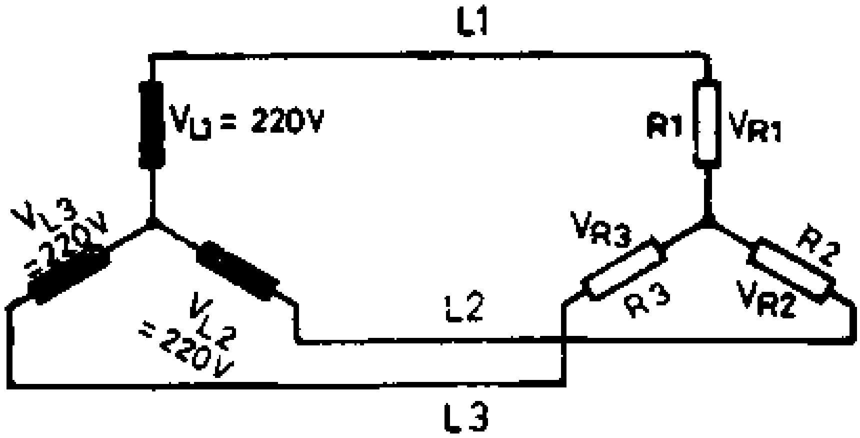
TC 4.2 The figure shows the voltage and current vector diagram for a three phase consumer. What type of consumer is it?



1. A three phase motor.
2. A three phase coil with a very small ohmic resistance.
3. Star−connected heating resistances.
4. Delta − connected heating resistances.
5. Capacitors in star circuit.

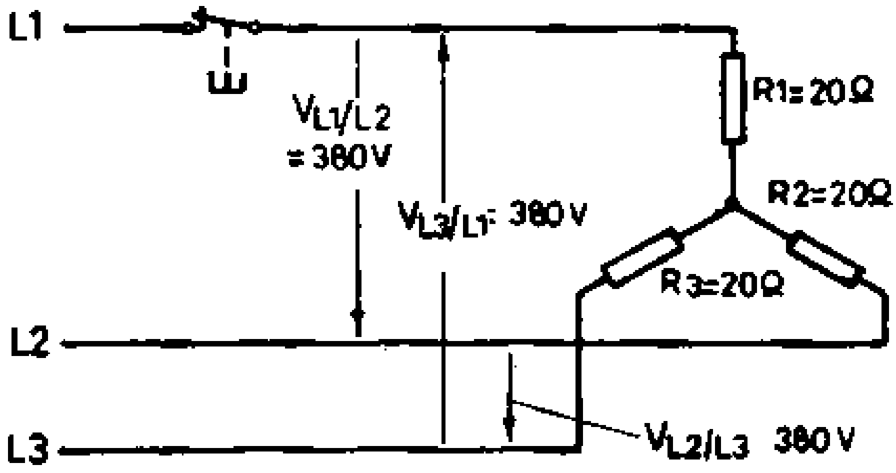
TC 4.3 The figure shows a circuit of a three phase generator which is loaded with star connected resistances R_1, R_2 and R_3 of the same value.

Which of the following voltage values is correct?



1. $V_{L1/L2}$ = 220 V
2. $V_{L1/L2}$ = 127 V
3. $V_{L1/L2}$ = 380 V
4. $V_{L1/N}$ = 380 V
5. $V_{L1/N}$ = 127 V

TC 5.1 Three resistances are connected to a three phase generator as shown in the figure. What is the voltage value across each of the resistances R_1, R_2 and R_3, which have the same value ?

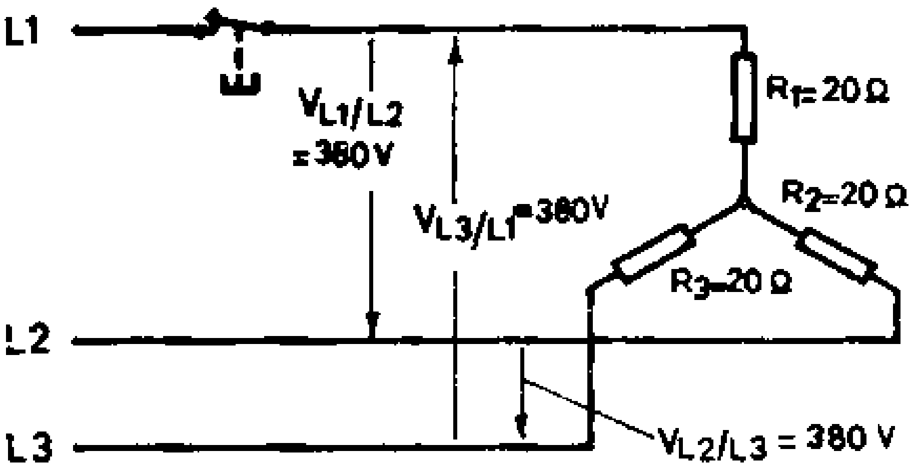


1. 380 V
2. $\frac{380V}{2} = 190V$
3. $380V \times \sqrt{3} = 657V$
4. $\frac{380V}{\sqrt{3}} = 220V$
5. $\frac{380V}{\sqrt{3}} = 127V$

TC 5.2 Three resistances are connected to a three phase generator as shown in the above figure. The resistance of the generator winding is negligible. Which of the following formulae for the calculation of the line current I – is correct?

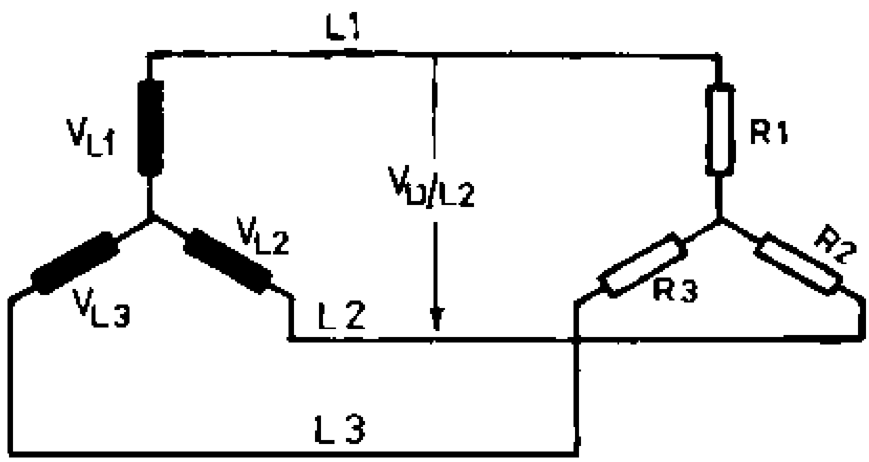
1. $I_{L1} = \frac{380V}{2 \times 20\Omega}$
2. $I_{L1} = \frac{380V}{20\Omega}$
3. $I_{L1} = \frac{380V \times \sqrt{3}}{20\Omega}$
4. $I_{L1} = \frac{380V}{\sqrt{3} \times 20\Omega}$
5. $I_{L1} = \frac{380V \times \sqrt{3}}{2 \times 20\Omega}$

TC 5.3 The switch of the circuit shown in the above figure is opened. What is the voltage V_{L2} across the resistance R_2?



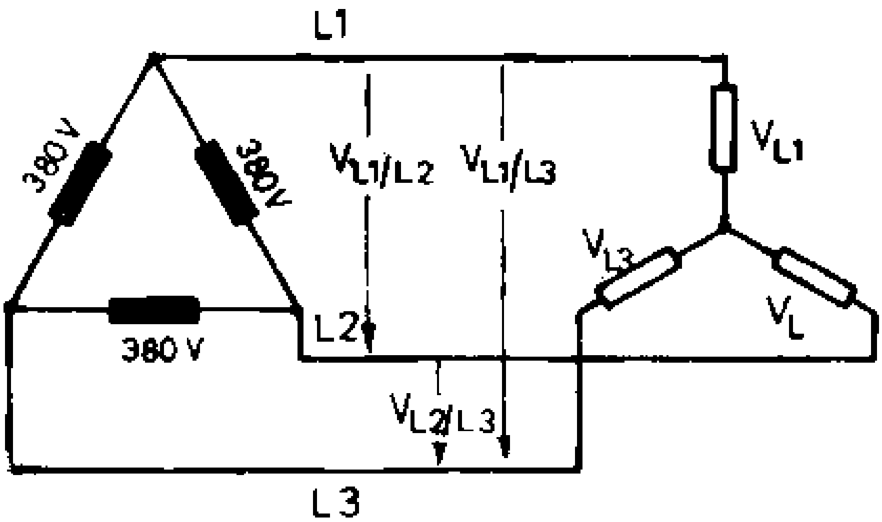
1. V_{L2} = 110V
2. V_{L2} = 190 V
3. V_{L2} = 220 V
4. V_{L2} = 380 V
5. V_{L2} = 127 V

TC 6.1 What is the relation between the phase voltage V_{L1} and the line voltage $V_{L1/L2}$ in the figure?



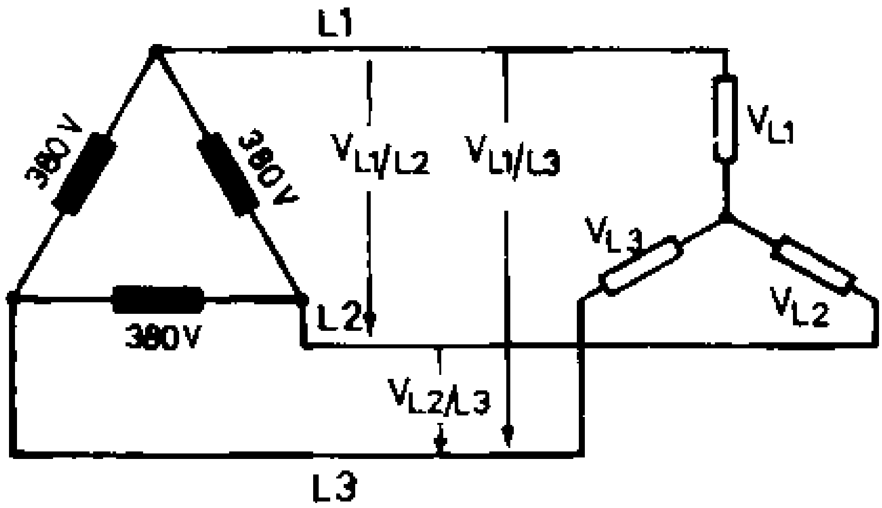
1. $V_{L1} = \sqrt{3} \times V_{L1/L2}$
2. $V_{L1/L2} = \sqrt{3} \times V_{L1}$
3. $V_{L1/L2} = 2 \times V_{L1}$
4. $V_{L1/L2} = \sqrt{2} \times V_{L1}$
5. $V_{L1/L2} = \frac{V_{L1}}{\sqrt{2}}$

TC 6.2 What are the values of the voltages $V_{L1/L2}$, $V_{L1/L3}$ and $V_{L2/L3}$ in the figure shown?



1. $380V \times \sqrt{3} = 657V$
2. 500 V
3. 380 V
4. 220 V
5. 127 V

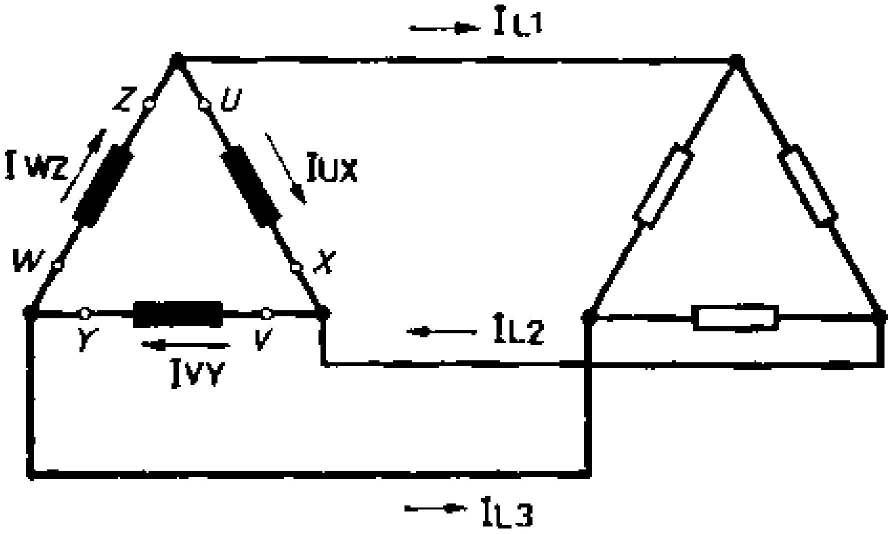
TC 6.3 What are the values of the voltages V_{L1}, V_{L2} and V_{L3} in the figure shown?



1. 127 V
2. 220 V
3. 380 V
4. 440 V
5. 500 V

TC 7.1 The generator phase currents I_{UX}, I_{VY} and I_{WZ} are equal.

How can the line current I_{L1}. be calculated from these currents?



1. $I_{L1} = \sqrt{3} \times I_{UX}$
2. $I_{L1} = 2 \times I_{UX}$
3. $I_{L1} = \frac{I_{UX}}{2}$
4. $I_{L1} = \frac{I_{UX}}{\sqrt{3}}$
5. $I_{L1} = I_{UX}$

TC 7.2 How can the true power drawn by a balanced three phase consumer be calculated when the line voltage is V and the line current is I?

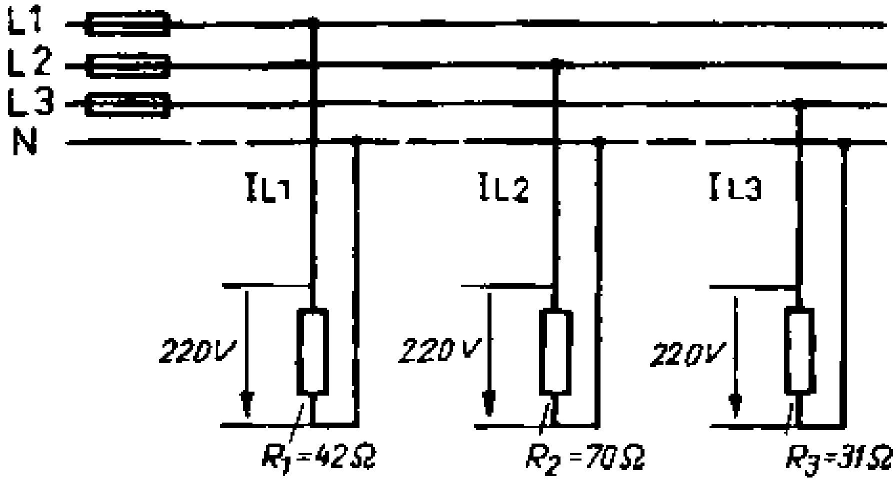
1. $P = V \times I \times \cos\varphi$
2. $P = 3 \times V \times I \times \cos\varphi$
3. $P = \sqrt{3} \times V \times I \times \cos\varphi$
4. $P = \sqrt{3} \times V \times I$
5. $P = 3 \times \sqrt{3} \times V \times I \times \cos\varphi$

TC 7.3 Which of the following formulae gives the speed of a rotating magnetic field when the frequency f and the number of pole pairs p is known?

1. $n = f \times p$
2. $n = \frac{60 \times f}{p}$
3. $n = 60 \times f \times p$
4. $n = \frac{60 \times p}{f}$
5. $n = \frac{f}{p}$

TC 7.4 The supply circuit is loaded with the consumers R_1, R_2 and R_3, which have different values.

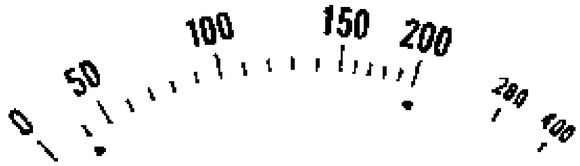
What is this type of load called?



1. Co−phasal load
2. Non−phasal load
3. Star point load
4. Unbalanced load
5. Balanced load

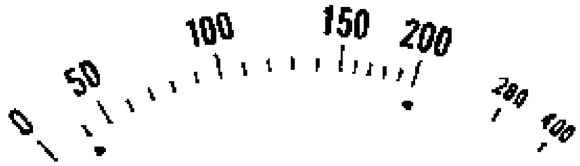
Measuring Instruments

MI 1.1 What are the initial and final values of the scale shown in the figure?



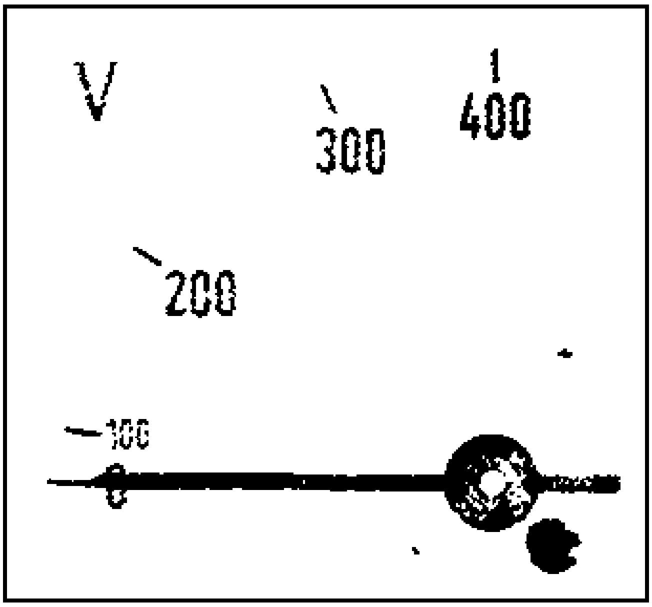
1. Initial value: 0, final value: 200
2. Initial value: 0, final value: 400
3. Initial value: 25, final value: 200
4. Initial value: 40, final value: 200
5. Initial value: 40, final value: 400

MI 1.2 What are the initial and the final values of the measuring range of the scale shown in the figure?



1. Initial value: 0, final value: 200
2. Initial value: 0, final value: 400
3. Initial value: 25, final value: 200
4. Initial value: 40, final value: 200
5. Initial value: 40, final value: 400

MI 1.3 What is the permissible error and the permissible indication error for the instrument shown in the figure?



1. Permissible error: 0.15 %
   indication error: 0.6 V
2. Permissible error: 1.5 %
   indication error: 6 V
3. Permissible error: 15 %
   indication error: 60 v
4. Permissible error: 1.5 V
   indication error 1.5 v
5. Permissible error: 15 V
   indication error 15 V

MI 2.1 In which part of the scale indicates the pointer most accurately?

1. In the first third of the scale.
2. In the first half of the scale.
3. In about the middle of the scale.
4. In the second half of the scale.
5. In the last third of the scale.

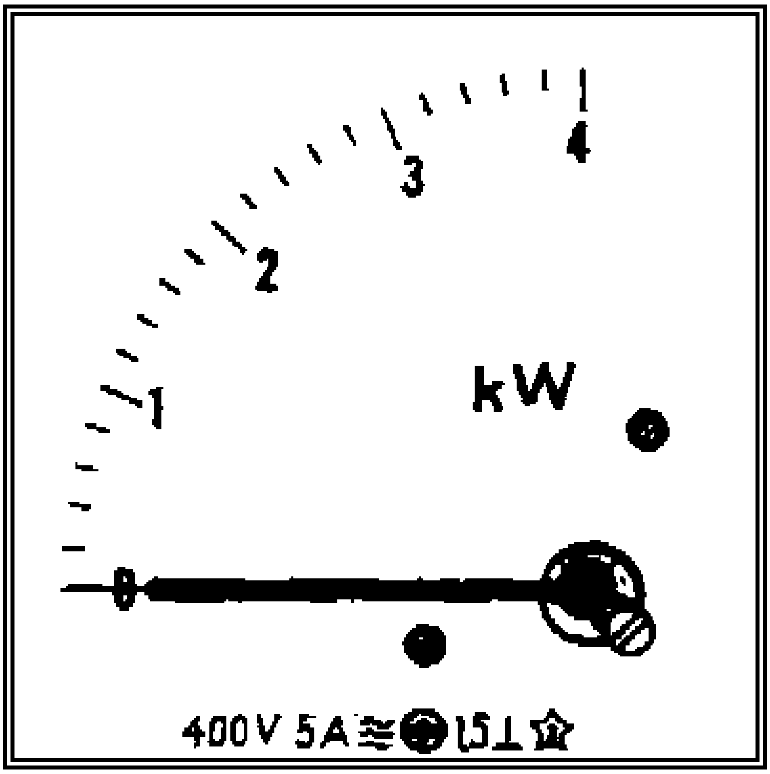
MI 2.2 What should be the accuracy classes of industrial measuring instruments?

1. Accuracy classes 0.1, 0.2 and 0.5.
2. Accuracy classes 0.5 and 1.
3. Accuracy classes 0.5, 1, 1.5, 2.5 and 5.
4. Accuracy classes 1, 1.5, 2.5 and 5.
5. Accuracy classes 5 and 7.5

MI 2.3 The figure shows ammeters reduced according to the scale 1:5. Which of the ammeters is most sensitive?

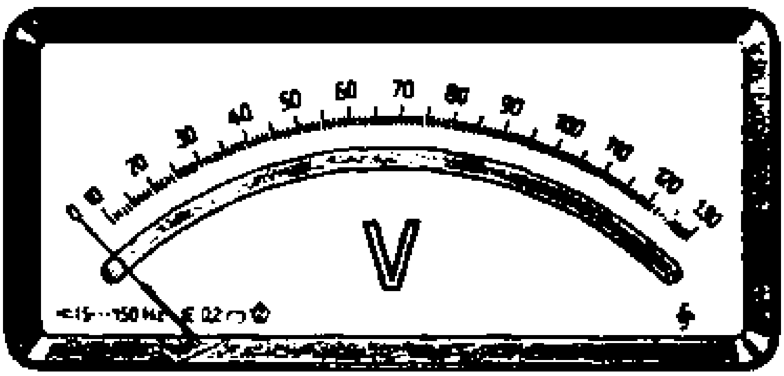
1. Ammeter 1
2. Ammeter 2
3. Ammeter 3
4. Ammeter 4
5. Ammeter 5

MI 3.1 Which of the following statements is true about the measuring instrument shown in the figure?



1. The instrument is a high frequency measuring instrument.
2. The test voltage of the instrument is 400 V.
3. The instrument is made to be used in horizontal position.
4. The current coil can be loaded upto 5 A.
5. This is a precision instrument.

MI 3.2 Which of the statements about the measuring instrument shown in the figure is true?

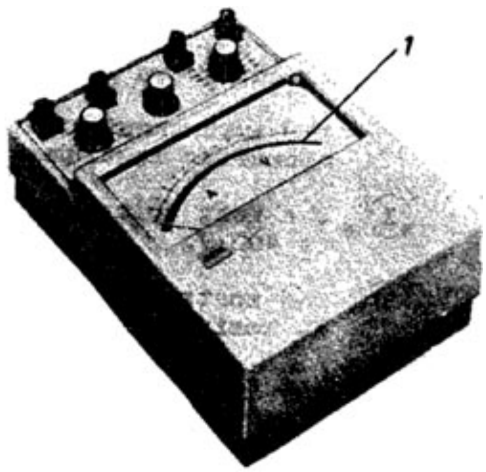


1. The instrument is made to be used in vertical position.
2. The instrument is only suitable for the measurement of high frequency voltages.
3. The test voltage of the instrument is 200 V.
4. It is a precision instrument.
5. The permissible Indication error can be 26 v.

MI 3.3 What is the correct reading on the scale shown in the figure?

1. 3.5
2. 3.25
3. 3.3
4. 3.35
5. 3.4

MI 4.1 What is the purpose of the mirror marked 1?

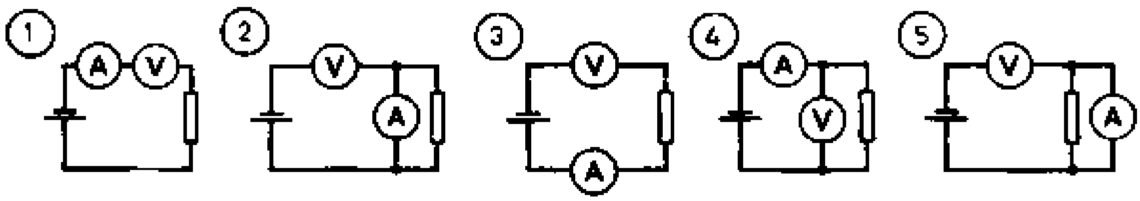


1. The scale is illuminated through the mirror.
2. With the help of the mirror it can be seen whether the pointer is bent or not.
3. The mirror is semi−transparent so as to allow the observation of the interior of the instrument.
4. Reading errors due to inclined observation are eliminated by the mirror.
5. The mirror prevents the electrostatic charging of the pointer.

MI 4.2 How can it be ascertained whether one is looking perpendicularly at the scale of the above instrument?

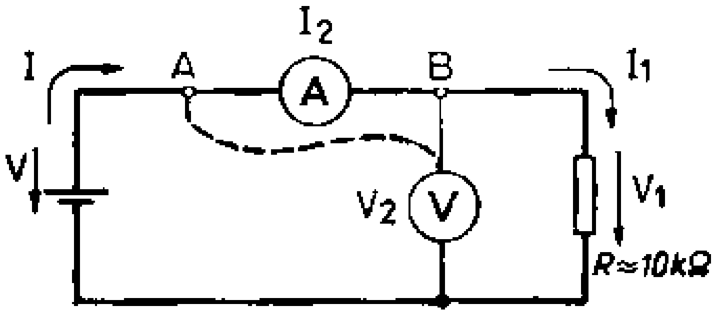
1. When one sees the image of the eye in the mirror.
2. When the pointer covers its own image.
3. When the tube pointer appears to be smallest.
4. When the observing eye is exactly above the centre of the scale.
5. When the observing eye is exactly above the zero point of the scale.

MI 4.3 In which of the circuits are the ammeter and the voltmeter connected correctly?



1. In circuit 1
2. In circuit 2
3. In circuit 3
4. In circuit 4
5. In circuit 5

MI 5.1 Which of the following statements to determine the value of resistance R in the shown circuit is true?



1. The indicated current I_2 is smaller than I.
2. The voltage V_2 indicated by the voltmeter is higher than the voltage V_1 across the consumer.
3. The voltage V_2 indicated by the voltmeter is less than the voltage V_1 across the consumer.
4. The voltage V_2 indicated by the voltmeter is higher than V of the source.
5. For a more accurate result, the voltmeter should be connected in front of the ammeter (point A).

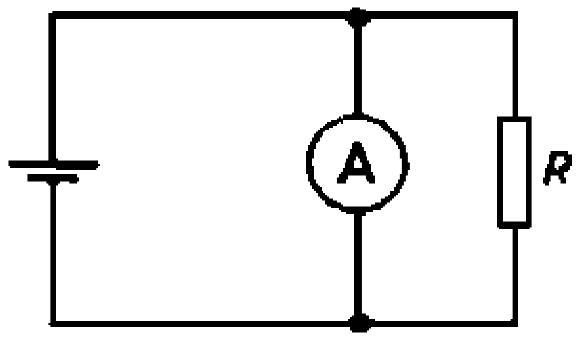
MI 5.2 Which of the following statements about the internal resistance of measuring instruments is true?

1. The internal resistance of ammeters should be very small and that of voltmeters very high.
2. The internal resistance of ammeters should be very high and that of voltmeters very small.
3. The internal resistance of ammeters and voltmeters should be very small.
4. The internal resistance of ammeters and voltmeters should be very high.
5. The internal resistance of ammeters and voltmeters has no significance.

MI 5.3 A consumer is connected to an alternating voltage. The power consumed is measured with the help of a wattmeter. Which of the following powers is indicated by the wattmeter?

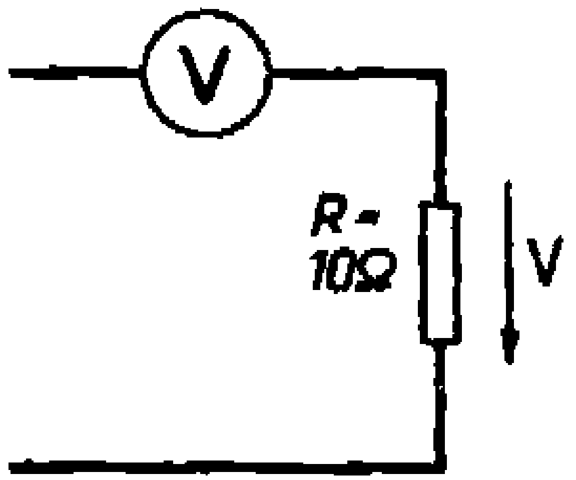
1. Apparent power
2. True power
3. Reactive power
4. The product of voltage and current (V x I)
5. The product V × I × sin?

MI 6.1 An ammeter is connected in a circuit as shown in the diagram. Which of the following statements is true?



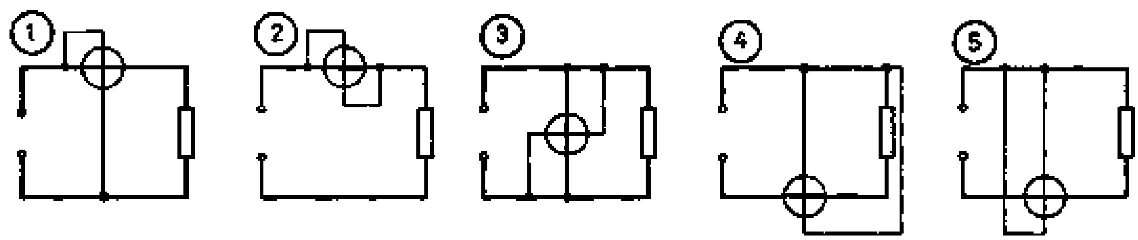
1. The ammeter is connected correctly.
2. The ammeter indicates a too small current.
3. The ammeter indicates a too high current.
4. The ammeter indicates nothing.
5. The ammeter short circuits the voltage source and the measuring system of the instrument is destroyed.

MI 6.2 A voltmeter is connected in a circuit as shown in the diagram. Which of the following statements is true?



1. The voltmeter is connected correctly.
2. The voltmeter indicates a slightly higher value of the voltage.
3. The pointer can only remain at zero.
4. The indicated voltage does not correspond to V.
5. The voltmeter shall be damaged in this connection.

MI 6.3 The power drawn by a resistance R is to be measured by a wattmeter. In which of the circuits is the wattmeter connected correctly?

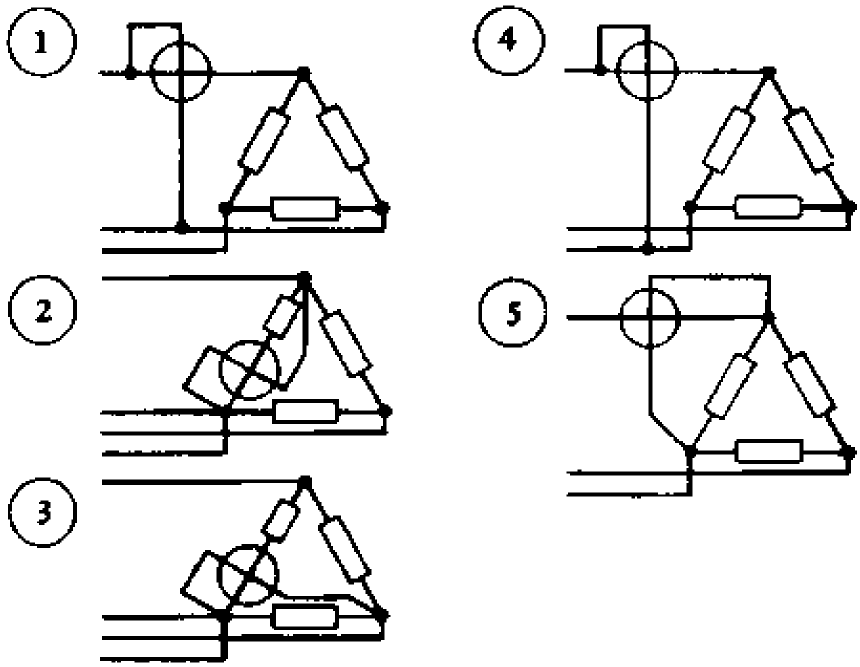


1. In circuit 1
2. In circuit 2
3. In circuit 3
4. In circuit 4
5. In circuit 5

MI 7.1 The power in an alternating current circuit is to be measured. The expected current is more than 5 A for which the current coil of the wattmeter is designed. How can this measurement be carried out?

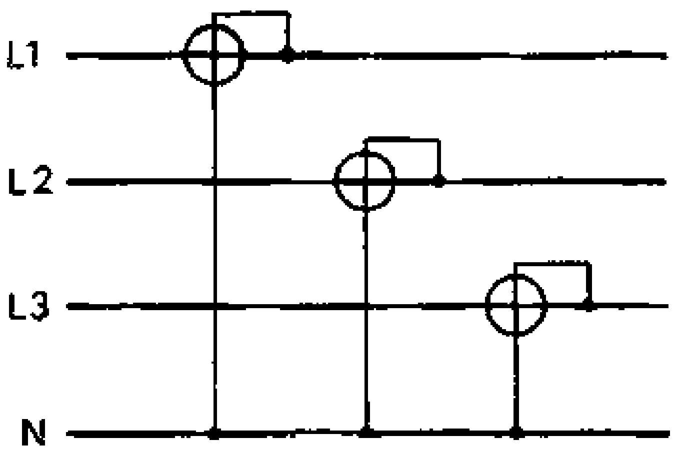
1. By connecting a resistance in series with the current coil.
2. By connecting a resistance parallel to the current coil.
3. By connecting a measuring capacitor parallel to the current coil.
4. By connecting a measuring coil parallel to the current coil.
5. By connecting the current coil with a current transformer.

MI 7.2 With which of the following circuits can the power consumed in one phase of the delta connected resistances be measured?



1. Circuit 1
2. Circuit 2
3. Circuit 3
4. Circuit 4
5. Circuit 5

MI 7.3 When is this complicated connection shown in the figure used for the measurement of power?



1. For a three phase four wire system having an unbalanced load.
2. For a three phase four wire system having a balanced load including inductive reactances.
3. For a three phase four wire system having a balanced load including capacitive reactances.
4. Only when the consumer resistances are connected in delta.
5. Only in high voltage circuits upto 6 kV.

MI 8.1 The function of a shunt in an ammeter is to

1. bypass the current.
2. increase the current in the coil.
3. decrease the voltage drop.
4. increase the meter resistance.

MI 8.2 A moving iron type instrument has

1. a linear scale (uniform scale).
2. a non−linear scale.

3. its deflection directly proportional to the current.
4. its deflection directly proportional to the voltage.
5. its deflection inversely proportional to the current.

MI 8.3 What will happen if a voltmeter is connected like an ammeter in series to the load?

1. The meter will burn out.
2. The measurement will be too high.
3. An inadmissably high current will flow.
4. There will be almost no current in the circuit.
5. The measurement will be correct.

MI 8.4 Which of the following is the best method to measure the energy consumed by an electric heater? By using

1. a watt−meter and a stop−watch.
2. an energy meter.
3. a voltmeter and an ammeter.
4. an ammeter and a stop−watch.
5. an ammeter, a voltmeter and a stop−watch.

MI 9.1 Electrodynamic types of instruments are used commonly for the measurement of

1. voltage.
2. current.
3. resistance.
4. power.
5. temperature.

MI 9.2 Moving coil instruments are used

1. in A.C. circuits only.
2. in both, A.C. and D.C. circuits.
3. in D.C. circuits only.
4. for measuring voltage only.
5. for measuring current only.

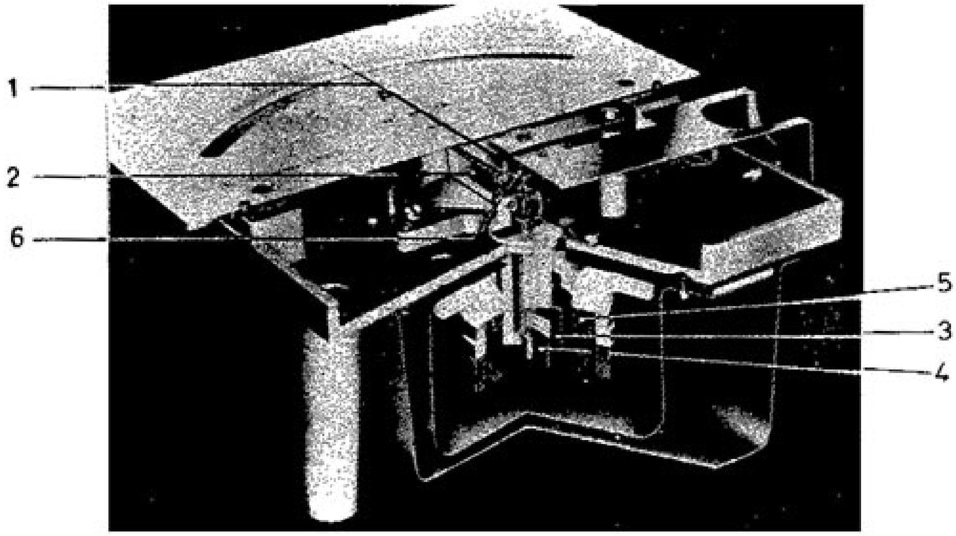
MI 9.3 To reduce the effect of a voltmeter upon the circuit being measured we should

1. decrease the multiplier resistance.
2. get an instrument with a higher internal resistance.
3. use a−parallel resistor.
4. use an A.C. meter with rectifier.
5. connect the voltmeter in series to the load.

MI 9.4 To increase the range of a voltmeter

1. a low resistance is connected in series.
2. a low resistance is connected in parallel.
3. a high resistance is connected in series.
4. a high resistance is connected in parallel.
5. a combination of series and parallel resistances is used.

MI 10.1 Which type of instrument is shown in the figure?



1. Soft iron measuring system.
2. Moving iron measuring system.
3. Moving coil measuring system.
4. Moving magnet measuring system.
5. Bimetallic measuring system.

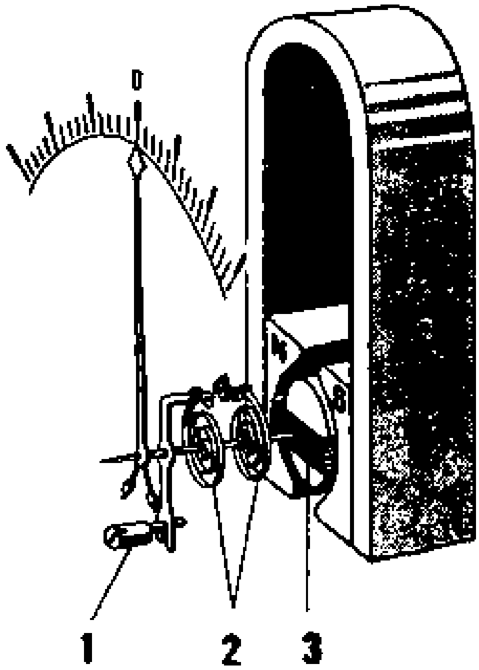
MI 10.2 Of which material are parts 3 and 4 of the above shown measuring system made?

1. Aluminium
2. Soft magnetic material
3. Hard magnetic material
4. Insulation material with a high dielectric constant
5. Copper

MI 10.3 The easiest way of measuring power in a balanced three phase circuit is the

1. three wattmeter method.
2. one wattmeter method.
3. two wattmeter method.
4. voltmeter–ammeter method.
5. energy meter method.

MI 11.1 What is the function of the screw marked 1 in the figure?



1. It serves to conduct the current.
2. With this screw the sensitivity of the meter can be changed.
3. The zero point is corrected with the help of this screw.
4. The moving parts can be tightened to the casing with the help of this screw.
5. The measuring range can be changed with the help of this screw.

MI 11.2 If a moving iron type ammeter is connected in a circuit, and we interchange its connection, then

1. it will give no deflection.
2. its reading will not change.
3. it will deflect in the opposite direction.
4. it will burn out.
5. it will give a wrong measurement.

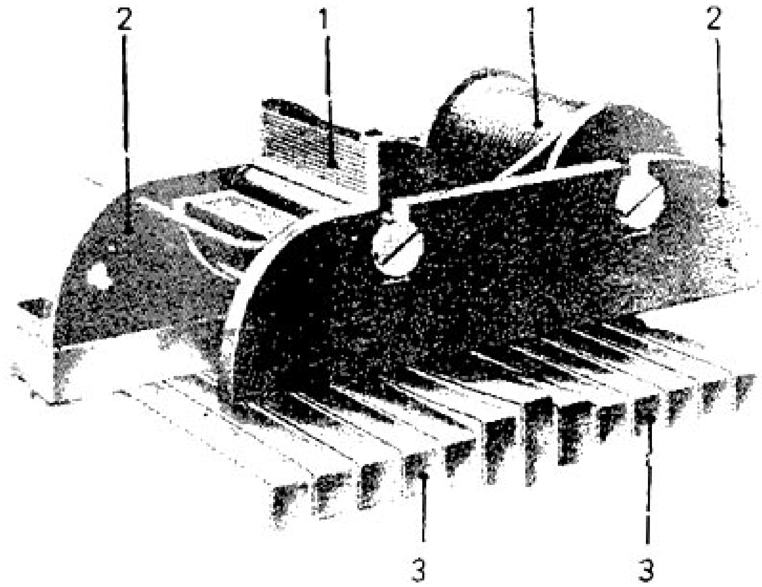
MI 11.3 Which of the following damping methods is common in moving−coil instruments?

1. Air damping
2. Fluid damping
3. Spring damping
4. Eddy current damping
5. Any of the above is used.

MI 11.4 The main reason for using springs in a measuring instrument is

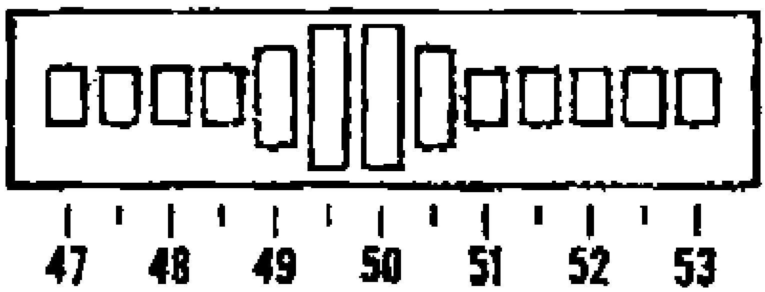
1. to conduct the current to the coils.
2. to hold the pivot in position.
3. to control the pointer movement.
4. to minimize the vibration of the pointer.
5. to provide the means for zero adjustment.

MI 12.1 The measuring system shown in the figure is built into reed frequency meters. What is it called?



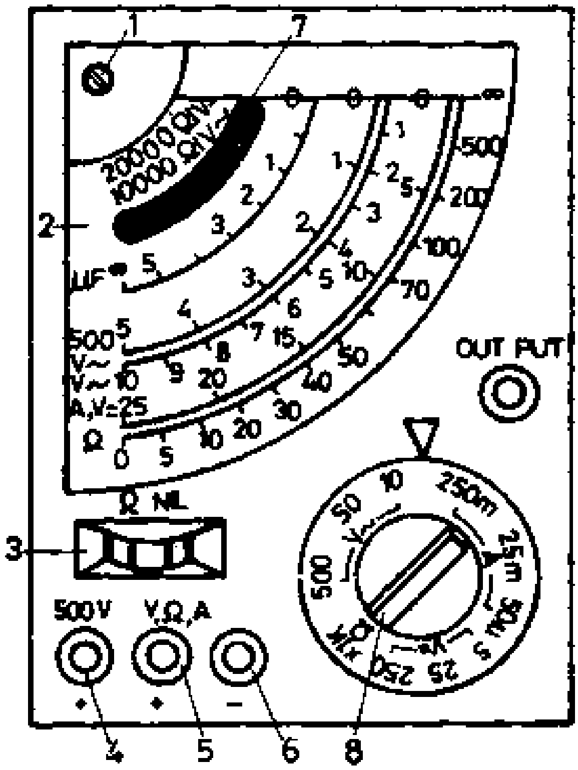
1. Oscillatory measuring system.
2. Vibrational measuring system.
3. Reflection measuring system.
4. Recording measuring system.
5. Two−coil measuring system.

MI 12.2 What frequency is indicated by the shown reed frequency meter?



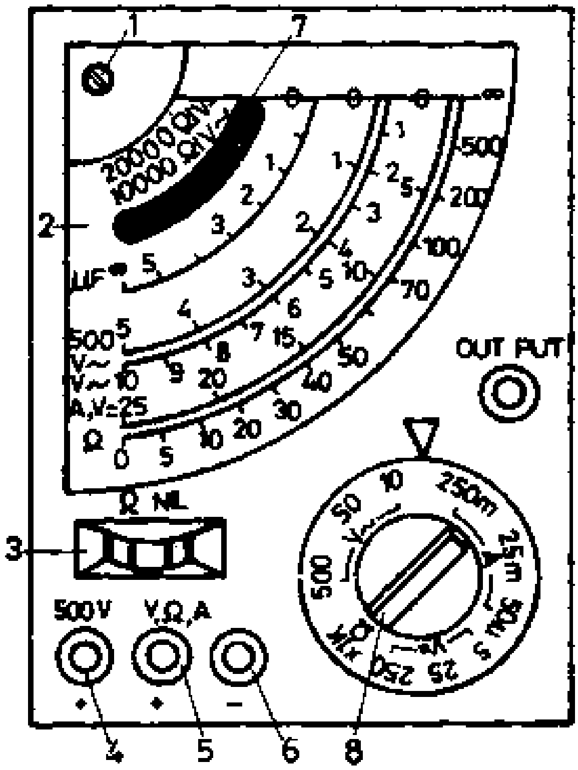
1. 49 Hz
2. 49.5 Hz
3. 49.75 Hz
4. 50 Hz
5. 50.25 Hz

MI 12.3 A multi−range instrument of the class 2.5 is shown in the figure. Which of the following statements is true?



1. The instrument is suitable for the measurement of direct voltage and alternating voltage.
2. When measuring voltage one starts with the smallest range and switches on in steps to wider ranges.
3. When measuring current one should principally start with the smallest range.
4. The instrument is equipped with a moving iron measuring system.
5. The screw marked 1 is used to compensate the variations of the surrounding temperature.

MI 13.1 While the instrument is adjusted for measuring direct current, it is by • mistake used to measure an alternating current. The scale selected is suitable for the current to be measured. What happens to the instrument?



1. The instrument indicates the correct value of the current.
2. The pointer does not deflect.

3. The instrument is damaged after a short while.
4. The pointer deflects forcefully to the end of the scale.
5. The instrument indicates the arithmetic mean value of alternating current instead of its effective value.

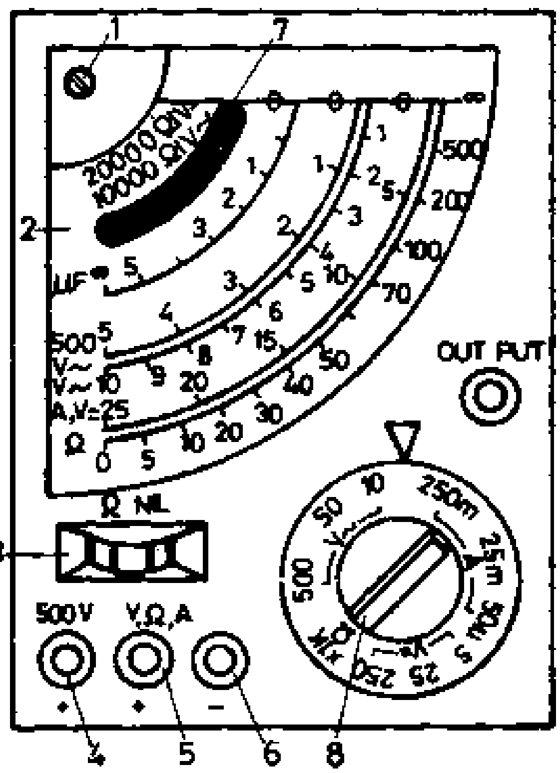
MI 13.2 With the help of the above shown multi−range instrument a current is to be measured which is expected to be about 5 mA. Which of the ranges should be selected before the meter is connected into the circuit?

1. 250 mA
2. 25 mA
3. 2.5 mA
4. 50 ?A
5. Any of the above scales can be selected.

MI 13.3 What is the function of the part marked 3 in the instrument shown above?

1. To select the measuring range.
2. For changing over from current to voltage measurement.
3. For zero adjustment in case of resistance measurements.
4. For zero adjustment in case of current and voltage measurements,
5. For changing over from A.C. to D.C. measurement.

MI 14.1 What is the internal resistance of the meter shown at the range 10 V~?



1. 100 ?
2. 1 000 ?
3. 10 000 ?
4. 20 000 ?
5. 100 000 ?

MI 14.2 What is the largest alternating current and voltage which can be measured with the help of the multi−range instrument shown in the figure?

1. Alternating current: 250 mA

   Alternating voltage: 500 V

2.	Alternating current:	250 mA
	Alternating voltage:	10 V
3.	Alternating current:	1 A
	Alternating voltage:	500 V
4.	Alternating current:	no range
	Alternating voltage:	10 V
5.	Alternating current:	no range
	Alternating voltage:	500 V

Protective Methods

PM 1.1 Which of the following does not influence the strength of an electric shock to a human body?

1. Duration of current flow
2. Frequency
3. Voltage
4. Strength of current
5. Ambient temperature

PM 1.2 Earthing is necessary to give protection against

1. voltage fluctuation.
2. overloading.
3. danger of electric shock.
4. high temperature of the conductors.
5. short circuit between phases.

PM 1.3 The primary function of a fuse is to

1. protect the appliance.
2. open the circuit.
3. prevent excessive currents.
4. protect the line.
5. indicate faults in the circuits.

PM 1.4 A thermal protection switch is able to protect against

1. overload.
2. over voltage.
3. temperature.
4. short circuit.
5. undervoltage.

PM 1.5 In which of the following cases are delay fuses used?

1. For the protection of light circuits.
2. For the protection of power out−let circuits.
3. For the protection of fluorescent lamps.
4. For the protection of electric heaters.
5. For the protection of motors.

PM 2.1 It is fatal to touch a live wire because

1. the human body becomes part of the electric circuit.
2. the voltage may cause burns to the skin.
3. the current may cause burns to the skin or inside the body.
4. it causes damage to the heart and nerve system.
5. the human body is able to conduct high current to the ground.

PM 2.2 A fuse is able to protect a circuit when

1. it is fitted at the end of the circuit.
2. the size of the fuse wire is appropriate for the load.
3. the size of the fuse wire is appropriate for the size of the line.
4. the fuse is fitted at the beginning of the circuit.
5. the fuse wire is strong enough.

PM 2.3 When extra stop buttons are added to an existing starter control circuit they must be

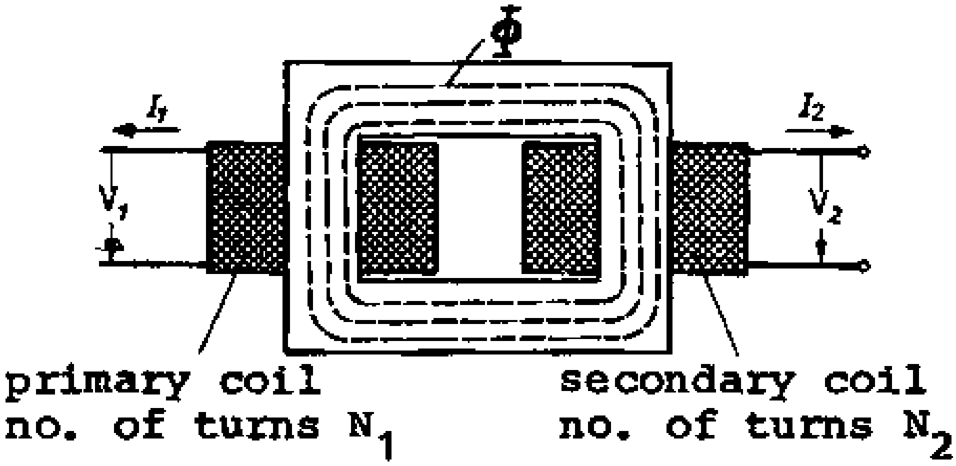
1. in series with the contactor coil.
2. parallel to the overload.
3. parallel to the start button.
4. in series with the motor.
5. parallel to the auxiliary contacts.

PM 2.4 A single phase motor protection switch is adjusted according to

1. the maximum starting current.
2. the cross−sectional area of the feeding line.
3. the rated current.
4. the capacity of the fuse.
5. 1.2 time the rated current.

Transformers

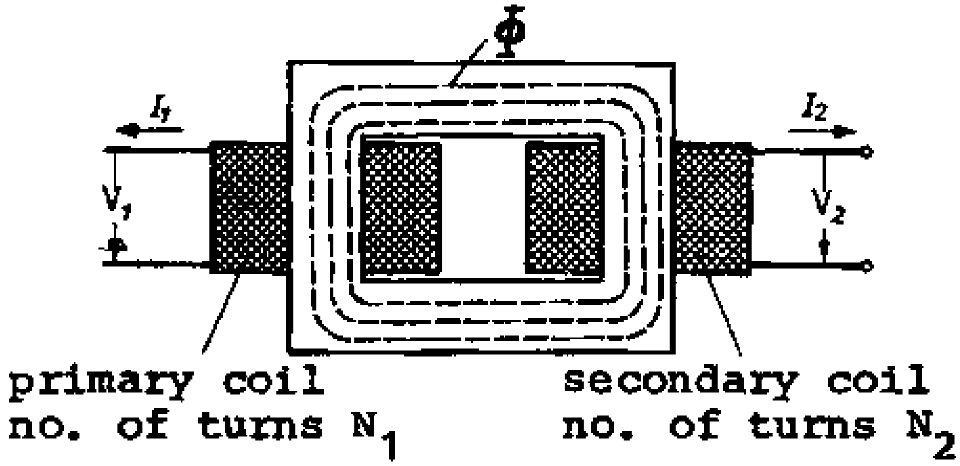
T 1.1 The figure shows the schematic diagram of a transformer. What is the relation between the voltages V_1 and V_2 and the no. of turns N_1 and N_2?



1. $\frac{V_1}{V_2} = \frac{N_1}{N_2}$
2. $\frac{V_1}{V_2} = \frac{N_2}{N_1}$
3. $V_1 \times V_2 \approx N_1 \times N_2$
4. $V_1 \times N_1 \approx V_2 \times N_2$

5. $V_1 \times V_2 \approx \frac{N_1}{N_2}$

T1.2 The figure shows the schematic diagram of a transformer. What is the relation between the currents I_1 and I_2 and the no. of turns N_1 and N_2?



1. $I_1 \times I_2 \approx N_1 \times N_2$
2. $I_1 \times N_2 \approx I_2 \times N_1$
3. $\frac{I_1}{I_2} \approx \frac{N_1}{N_2}$
4. $\frac{I_1}{I_2} \approx \frac{N_2}{N_1}$
5. $I_1 \times I_2 \approx \frac{N_1}{N_2}$

T1.3 One of the windings of a transformer is made of thin wire and the other of thick wire. Which of the following statements is true?

1. The winding made of thin wire is always the primary winding.
2. The winding made of thin wire is always the secondary winding.
3. The winding made of thin wire is always the low voltage winding.
4. The winding made of thin wire is always the high voltage winding.
5. The winding made of thin wire has fewer turns.

T 2.1 What happens if a much too high voltage is applied to a transformer?

1. The transformer draws a very high magnetising current and the primary winding is destroyed.

2. The leakage flux becomes so large that the secondary voltage becomes lower in case the nominal primary voltage is applied.

3. The humming of the transformer becomes very loud, but there are no further disadvantages.

4. Due to very large hysteresis losses the iron core heats up and burns.

5. Due to eddy current losses the iron core heats up and burns.

T 2.2 The transformer principle is based on

1. self−induction.
2. mutual−induction.
3. electric induction.
4. the Lenz law.

5. an alternating field.

T 2.3 Which loss does not occur in a transformer?

1. Eddy current loss
2. I^2R loss
3. Hysteresis loss
4. Friction loss
5. Saturation loss

T 2.4 Would it be easily possible to generally use a frequency of 5 Hz instead of 50 Hz?

1. Yes, because the frequency of 50 Hz was selected arbitrarily. The frequency of 5 Hz would indeed be more favourable because the skin effect would be less.

2. Yes, but it is not done due to the high cost of changing | the present system.

3. No, because in case of 5 Hz the insulation of cables and conductors should be stronger.

4. No, because the losses in cables and conductors are higher at lower frequencies.

5. No, because for 5 Hz the number of turns of transformer−coils (for the same cross−section of iron core) should be about 10 times more than for 50 Hz.

T 3.1 Why are transformer cores laminated?

1. Laminated cores are cheaper than solid cores.
2. There are fewer eddy current losses in laminated cores.
3. There are fewer hysteresis losses in laminated cores.
4. There is less humming as compared to solid cores.
5. Due to the intermediate layer of air between the laminations, these cores allow better cooling.

T 3.2 Which of the following statements about the humming of transformers is true?

1. The humming is caused by vibrations of the low voltage winding through which the high current flows.

2. The humming is caused by the periodic force of attraction between the laminations of the core.

3. The frequency of humming tone is $\frac{50}{2} = 25\,\text{Hz}$.

4. The frequency of humming tone is 50 Hz.

5. The frequency of humming tone is 2 × 50 Hz = 100 Hz.

T 3.3 What is meant by the leakage flux of a transformer?

1. It is the flux which is linked with the primary and the secondary winding.

2. It is that part of the magnetic flux which is significant for radio interference.

3. It is the magnetic flux which is linked either only with the primary or only with the secondary winding.

4. The leakage flux in the transformer is the flux whose path is exclusively through the air.

5. The leakage flux in the transformer is the flux whose path is exclusively through the casing of the transformer.

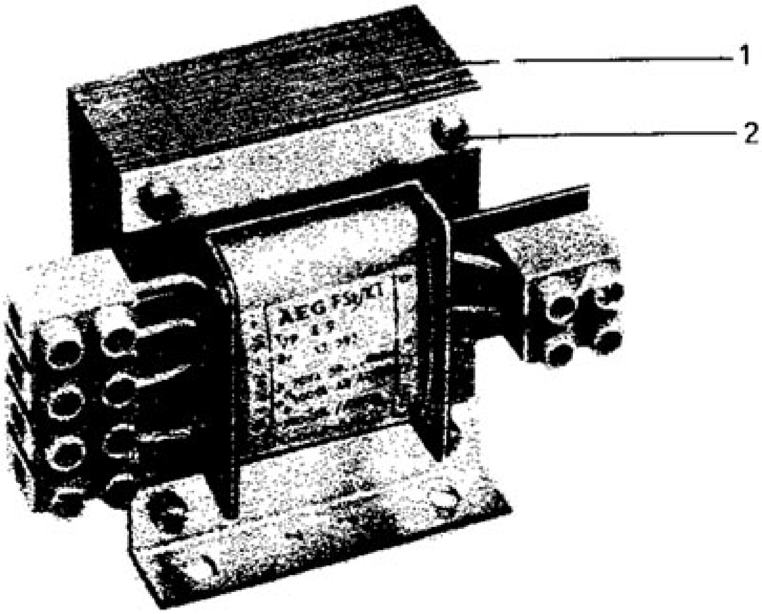
T 3.4 Hysteresis loss in a transformer depends upon the

1. applied voltage.
2. type of core material.
3. number of laminations.
4. reactance of the windings.
5. resistance of the windings.

T 4.1 The loss due to eddy currents in a transformer is

1. directly proportional to the current.
2. indirectly proportional to the current.
3. indirectly proportional to the resistance of the winding.
4. directly proportional to the resistance of the winding.
5. directly proportional to the number of laminations.

T 4.2 Why is the transformer core marked 1 in the figure laminated?

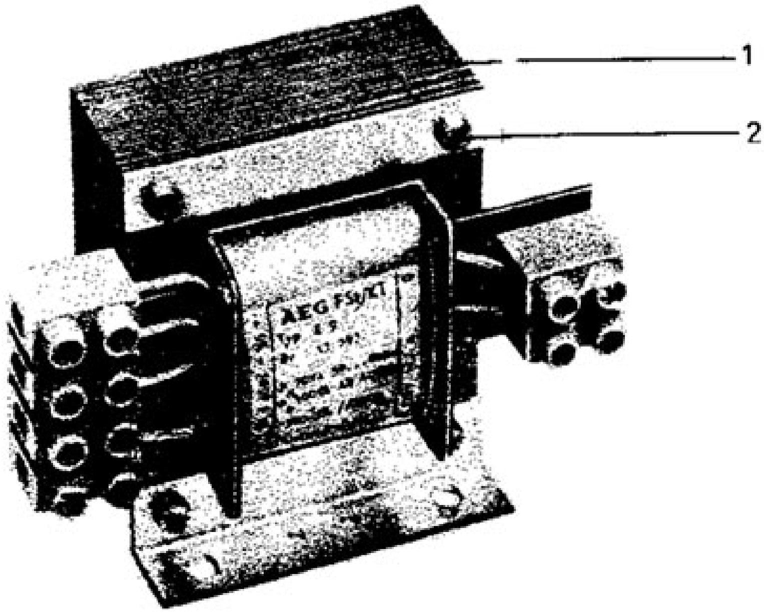


1. To increase the short circuit voltage of the transformer.
2. To increase the power factor.
3. To increase the no−load current.
4. To decrease the eddy current losses.
5. To decrease the hysteresis losses.

T 4.3 Which of the following statements about a short circuit proof transformer is true?

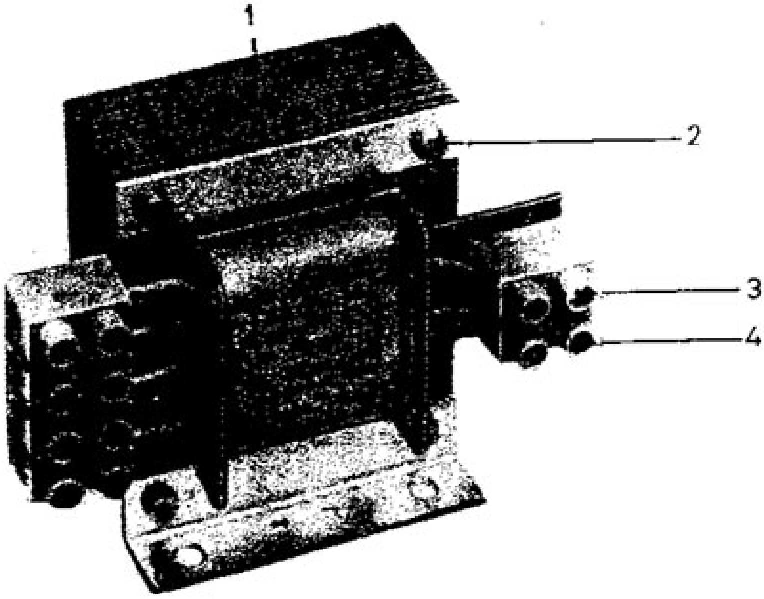
1. There is a fuse in its primary circuit.
2. There is a bimetallic switch in its primary circuit.
3. There is a fast magnetic switch in its primary circuit.
4. There is a fast magnetic switch in its secondary circuit.
5. The short circuit current can continuously flow through it without causing a damage.

T 5.1 Why is there an enamel layer coated over the laminations of the transformer core marked 1 in the figure?



1. To decrease the hum.
2. To prevent the friction between the laminations.
3. To attain adhesion between the laminations.
4. To insulate the laminations against each other.
5. To prevent the corrosion of the laminations.

T 5.2 Which of the following statements about the screws marked 2 in the figure is correct?



1. The screws should not be made of steel.
2. The screws should be made of copper.
3. The screws should be made of an insulating material.
4. The screws should be insulated against the core laminations.
5. The screws should be tightened slightly only.

T 5.3 What is the efficiency of transformers compared with that of electrical motors of the same power?

1. Much smaller
2. Somewhat smaller
3. About the same
4. Somewhat higher
5. Much higher

T 6.1 According to the name plate of a small transformer, the secondary nominal voltage is 220 V. Which of the following statements about it is true?

1. The no−load voltage is more than 220 V.
2. 220 V is the no−load voltage.
3. At a load which draws the rated current the voltage becomes less than 220 V.
4. The secondary voltage practically does not change when the transformer is loaded.
5. The secondary voltage increases with increasing load.

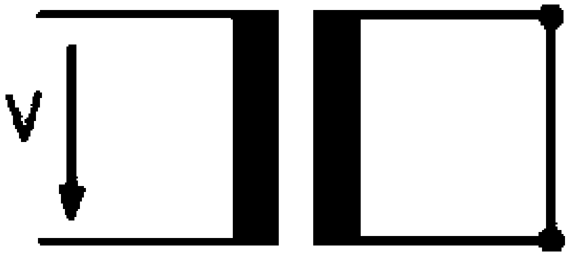
T 6.2 Upon which factor does the short circuit voltage of a transformer mainly depend?

1. On the ohmic resistance of the primary winding.
2. On the ohmic resistance of the secondary winding.
3. On the cross−sectional area of the iron core.
4. On the magnitude of the leakage flux.
5. On the quality of the insulation between the laminations of the iron core.

T 6.3 Which of the following statements about a transformer having a small short circuit voltage is true?

1. The transformation ratio of the transformer is small.
2. During operation the transformer has high iron losses.
3. During operation the transformer has high copper losses.
4. A high short circuit current flows through the transformer.
5. The transformer draws a high no−load current.

T 6.4 The rated current flows through the primary winding of the transformer shown. What is the voltage V called?



1. Short circuit voltage
2. Rated voltage
3. No−load voltage
5. Fault voltage
4. Operating voltage

T 7.1 What is meant by the nominal short circuit voltage V_{SCN} of a transformer?

1. The voltage appearing across the secondary terminals when they are short circuited.

2. After short circuiting two secondary terminals, the voltage appearing across the third and the short circuited terminals.

3. The primary voltage when the secondary terminals are short circuited and the rated current flows through the primary winding.

4. The voltage across the primary terminals when the secondary terminals are short circuited.

5. The voltage across the secondary terminals when the primary terminals are short circuited.

T 7.2 How is the nominal short circuit voltage represented?

1. As percentage of the test voltage.
2. As percentage of the nominal transformation ratio.
3. As percentage of the no−load secondary voltage.

4. As percentage of the rated primary voltage.
5. As percentage of the rated secondary voltage.

T 7.3 A 10 000 V/400V power transformer has a nominal short circuit voltage V_{SC} = 4 %. Which of the following statements about it is true?

1. A voltage of 400 V appears across the short circuited secondary terminals.

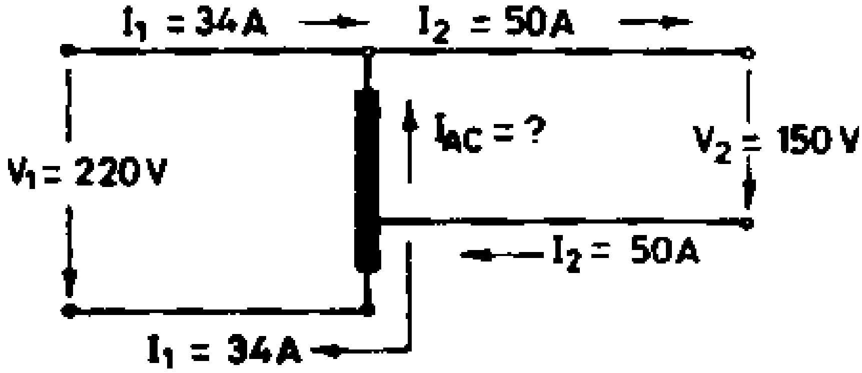
2. A voltage of 16V appears across the short circuited secondary terminals.

3. The primary voltage drops to 400 V when the secondary terminals are short circuited.

4. When the secondary terminals are short circuited, the rated current flows at the primary side at a primary voltage of 16 V.

5. When the secondary terminals are short circuited, the rated current flows at the primary side at a primary voltage of 400 V.

T 8.1 What is the current I_{AC} flowing through the auto–transformer shown in the figure?



1. I_{AC} = 50 A
2. I_{AC} = 34 A
3. I_{AC} = 20 A
4. I_{AC} = 16 A
5. I_{AC} = 12 A

T 8.2 What is the typical use of an auto–transformer?

1. Isolating transformer
2. Control transformer
3. Variable transformer
4. Toy transformer
5. Bell transformer

T 8.3 What is the phase difference between the low and the high voltage of a Yz5 power transformer?

1. 0°
2. 5°
3. 50°
4. 75°
5. 150°

T 8.4 Which of the following statements is true about a Dy5 power transformer?

1. The high voltage winding is connected in star.
2. The high voltage winding is connected in zig–zag.
3. The low voltage winding is connected in star.
4. The low voltage winding is connected in delta.
5. The phase difference between the low voltage and the high voltage is 5º

T 9.1 What is the advantage of a distribution transformer of group Yz5 compared to one of group Yy0?

1. It can be loaded unsymmetrically.
2. Its short circuit voltage is lower.
3. Its no−load current is lower.
4. Its efficiency is high.
5. Less copper is required for its windings.

T 9.2 The efficiency of a transformer is calculated by using the relation

1. $\eta = \frac{\text{output} \times 100}{\text{output} + \text{Culosses}}$
2. $\eta = \frac{\text{output} \times 100}{\text{output} + \text{ironlosses}}$
3. $\eta = \frac{\text{output} \times 100}{\text{input} + \text{Culosses}}$
4. $\eta = \frac{\text{output} \times 100}{\text{output} + \text{Culosses} + \text{ironlosses}}$
5. $\eta = \frac{\text{input}}{\text{output}} \times 100$

T 9.3 If in a transformer we double the secondary turns and at the same time reduce the primary voltage by half, then the secondary voltage will

1. be doubled.
2. be reduced to a quarter.
3. be halved.
4. be four times as high.
5. not change.

T 9.4 Transformers are rated in

1. kilo−watts.
2. kilo−watthours.
3. kilo−volt−amperes.
4. kilo−volts.
5. primary/secondary voltage.

T 10.1 Which is the common method of cooling a power transformer?

1. Air−cooling
2. Air−blast cooling
3. Oil−cooling
4. Natural cooling
5. None of the above is used as cooling method.

T 10.2 The efficiency in a transformer is maximum at

1. full load.
2. $\frac{1}{2}$ full load.
3. $\frac{1}{4}$ full load.
4. $\frac{1}{8}$ full load.
5. no load.

T 10.3 What type of core is used for a high frequency transformer?

1. Open iron core
2. Closed iron core
3. Shell type iron core
4. Air core
5. Aluminium core

T 10.4 Which of the statements below is true about the auto−transformer?

1. It has two separate windings connected in series externally.
2. It has only one winding.
3. It can only step down the voltage.
4. It is most suitable for power transformation.
5. It is best for high frequencies.

T 10.5 Which of the following is an instrument transformer?

1. Bell−transformer
2. Adjustable transformer
3. Ignition transformer
4. Welding transformer
5. Current transformer

T 11.1 The self−induction voltage of a coil depends upon

1. the voltage applied to the coil.
2. the shape of the iron core.
3. the shape of the bobbin.
4. the number of turns of the coil.
5. the frequency of the applied voltage.

T 11.2 For a 100 % efficient transformer the primary winding has 1000 turns and the secondary 100 turns. If the power input to the above transformer is 1000 watts, the power output is

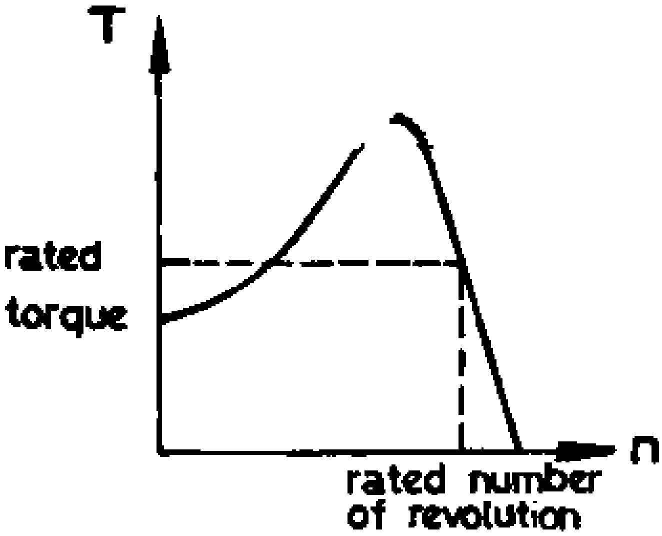
1. 1000 watts.
2. 100 watts.
3. 10 watts.
4. 10 kw.
5. 100 kw.

T 11.3 Which of the following is a correct statement about eddy currents ?

1. Eddy currents improve the efficiency of a motor.
2. Eddy currents do not influence the movement.
3. Eddy currents heat up the metal parts.
4. Eddy currents are used for arc welding.
5. Eddy currents can be totally avoided by using laminated metal parts.

AC−Machines

AC−M 1.1 Which of the following motors is represented by the shown characteristic curve?



1. D.C. shunt motor
2. D.C. series motor
3. D.C. compound motor
4. Asynchronous motor
5. Synchronous motor

AC–M 1.2 What does the data 940V/1030 A given on the nameplate represent?

AEG	
Three Phase Motor	Nr. 265/129
1600 kW Y6000V	183 A
1484 rpm.	50 Hz
940 V	1030 A
IP 23	5,6 t

1. 940 V: The lowest stator voltage.
2. 940 V: The voltage across two short–circuited sliprings.
3. 940 V: The voltage across two slip–rings when the rotor is stationary.
4. 1030 A: Current drawn from the circuit at rated load.
5. 1030 A; Rotor current at no load.

AC–M 1.3 Which of the following motors is used most frequently?

1. D.C. shunt motor.
2. A.C. induction motor
3. Three phase commutator motor
4. Three phase synchronous motor
5. Three phase induction motor

AC–M 1.4 Which of the following motors requires the most complicated speed control arrangement?

1. Three phase squirrel cage induction “motor.
2. Stator supplied three phase commutator motor.
3. Rotor supplied three phase commutator motor.
4. D.C. shunt motor.
5. D.C. shunt motor with an auxiliary series winding.

AC–M 2.1 For which of the following fields of application is the three phase induction motor mainly suitable?

1. For running of electric vehicles.
2. For running of rolling mills where an exact speed control is required.

3. For running of different machine tools where one or a few speeds are required.
4. For running of paper machines (the paper quality depends upon the exact speed control).
5. For running of an off-set printing machine where the control of the speed within a wide range is required.

AC–M 2.2 Which of the following statements about the three phase induction motor is true?

1. The speed of the induction motor cannot be controlled as easily and efficiently **as** that of a D.C. shunt motor.

2. The induction motor requires more maintenance than a D.C. motor.

3. The price of an induction motor is much higher than that of a D.C. motor of the same power and speed.

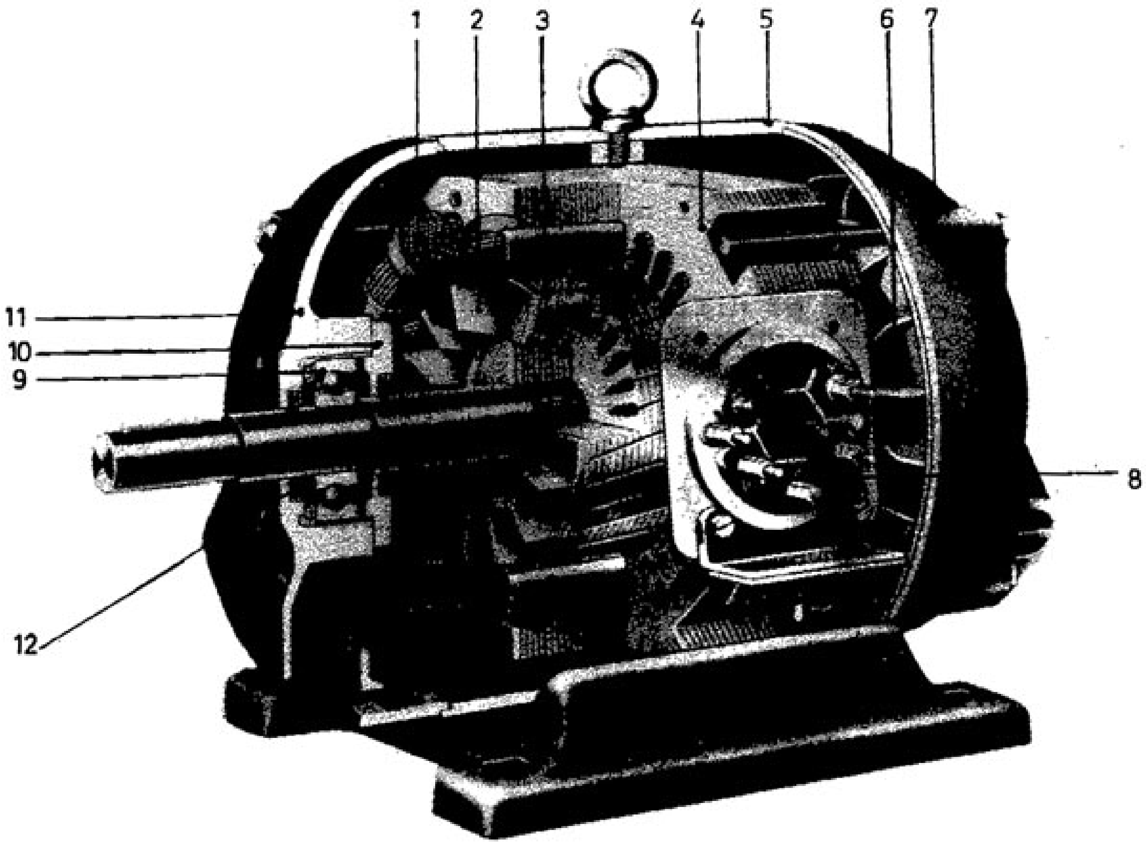
4. The induction motor is much more sensitive to overloads than a D.C. motor.

5. The losses in the induction motor are considerably higher than those in a D.C. motor of the same power.

AC–M 2.3 What is the advantage of the slipring induction motor over the squirrel cage induction motor?

1. It is suitable for higher speeds.
2. Its efficiency is higher.
3. Its power factor is higher.
4. Its slip is less.
5. It can be started with the help of rotor resistances.

AC–M 3.1 What does the figure represent?



1. A squirrel cage motor.
2. A slipring induction motor.
3. A wound rotor synchronous motor.
4. A salient pole synchronous motor.
5. A synchronous converter.

AC–M 3.2 The stator windings of the motor shown are to be connected in star. Which of the following sketches represents the correct connection ?

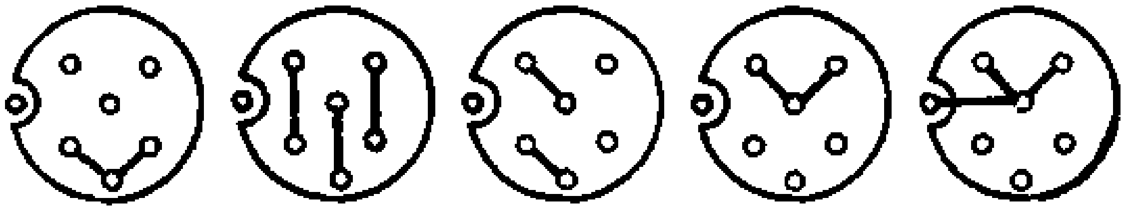
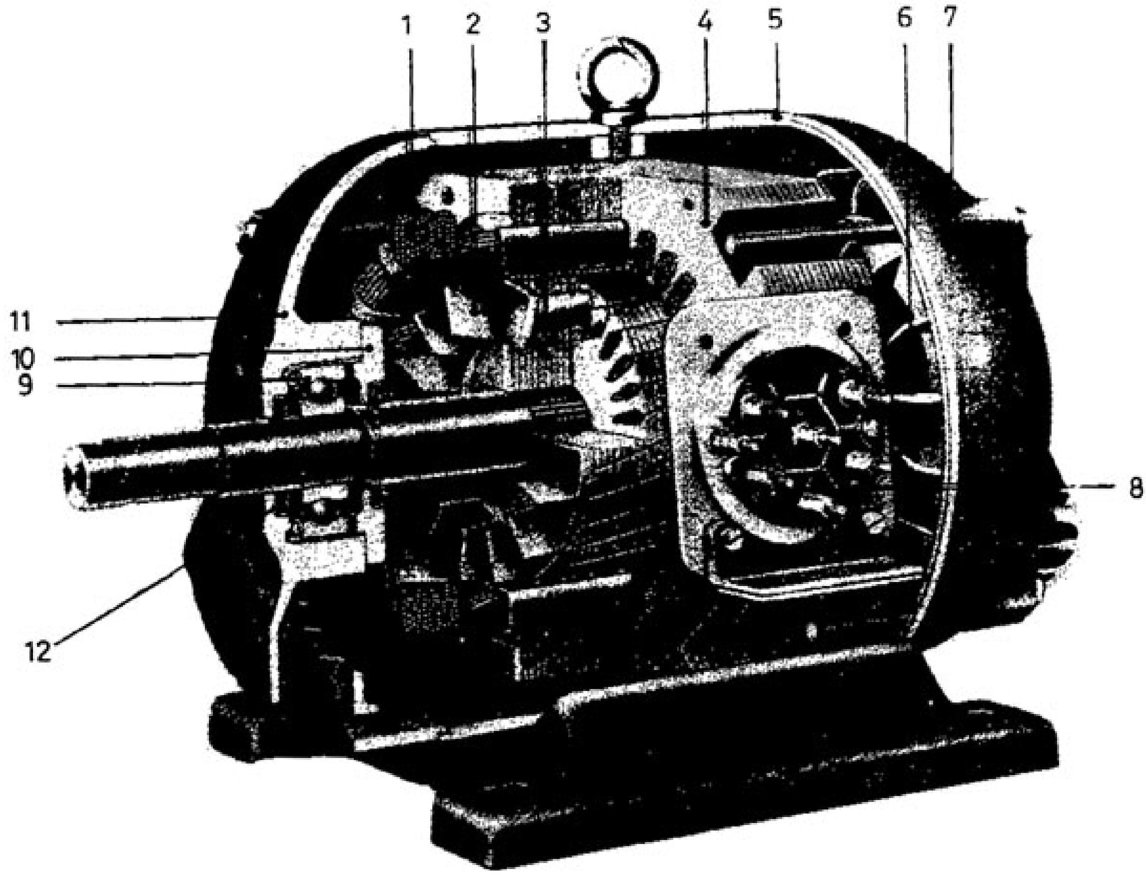


figure 1	figure 2	figure 3	figure 4	figure 5

AC−M 4.1 Which of the following statements about the motor shown is true?



1. The motor can run only in one direction.
2. The laminations of the rotor should be properly insulated against one another.
3. The cage rotor is made of copper.
4. The speed of the motor can be controlled with the help of auxiliary rotor resistances.
5. The stator winding produces a rotating magnetic field.

AC−M 4.2 The stator windings of the motor shown are to be connected in delta. Which of the following sketches represents the correct connection?

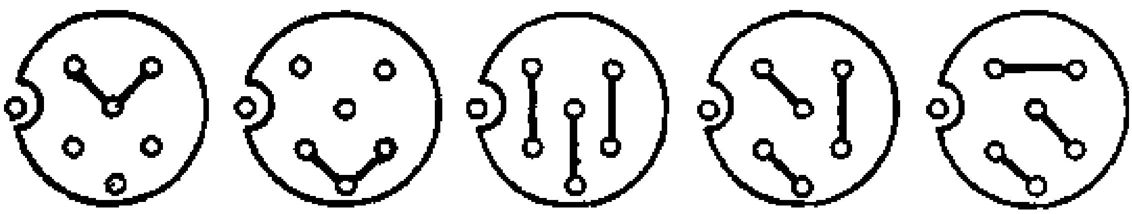
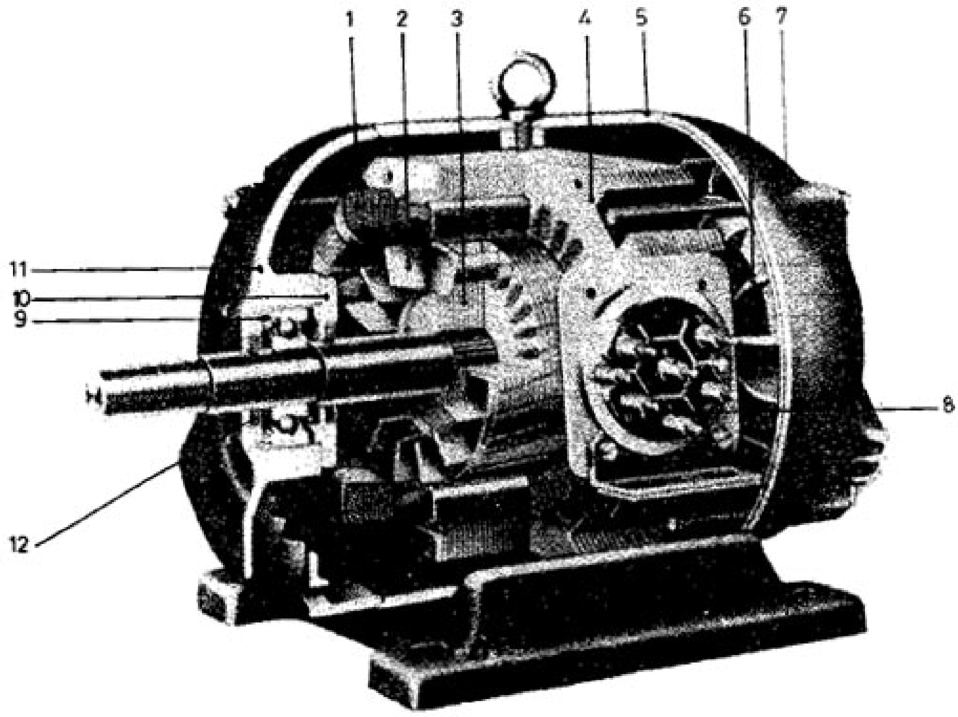


figure 1	figure 2	figure 3	figure 4	figure 5

AC–M 5.1 From which of the following materials is part 2 of the motor shown made?

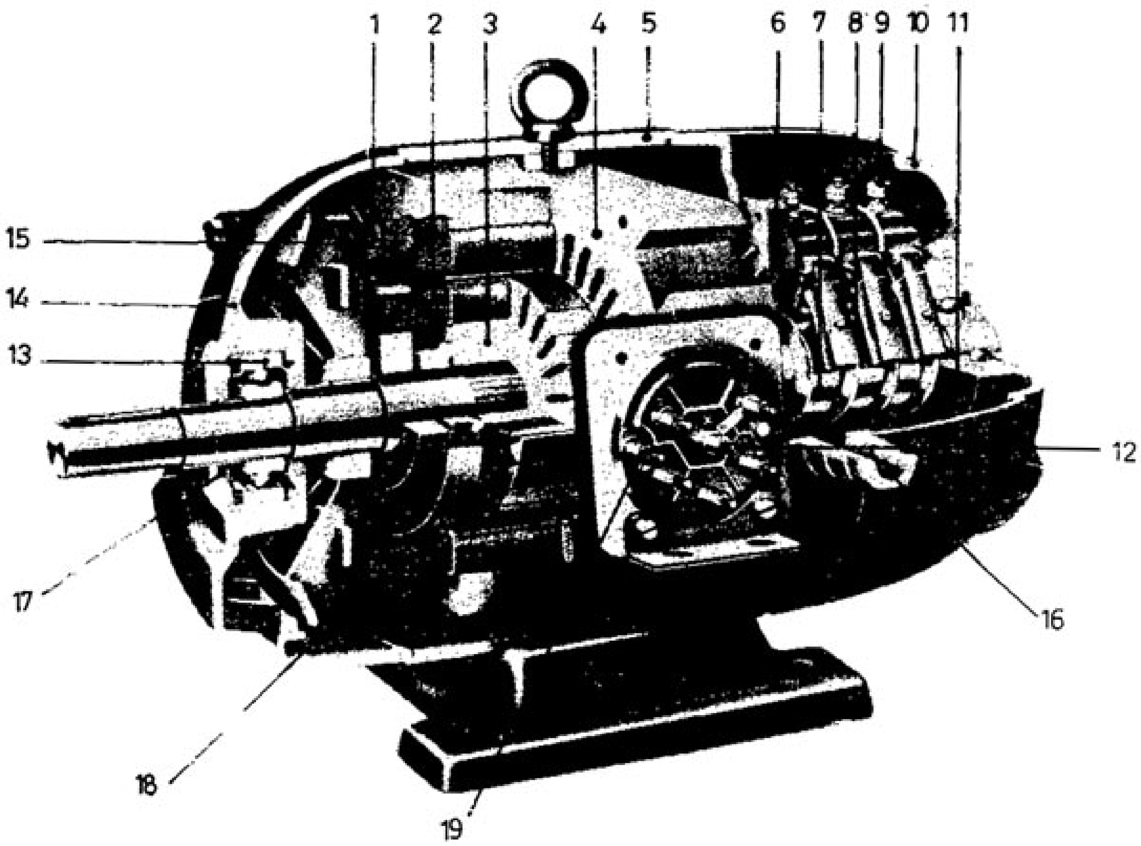


1. Copper
2. Aluminium
3. Brass
4. Bronze
5. Steel

AC–M 5.2 What is the purpose of the blades marked 2 in the figure?

1. To dynamically balance the rotor.
2. To reduce the magnetic resistance of the rotor.
3. To reduce the electrical resistance of the rotor cage.
4. To cool the rotor.
5. They serve no special purpose. They are merely formed during casting.

AC–M 6.1 What does the figure represent?

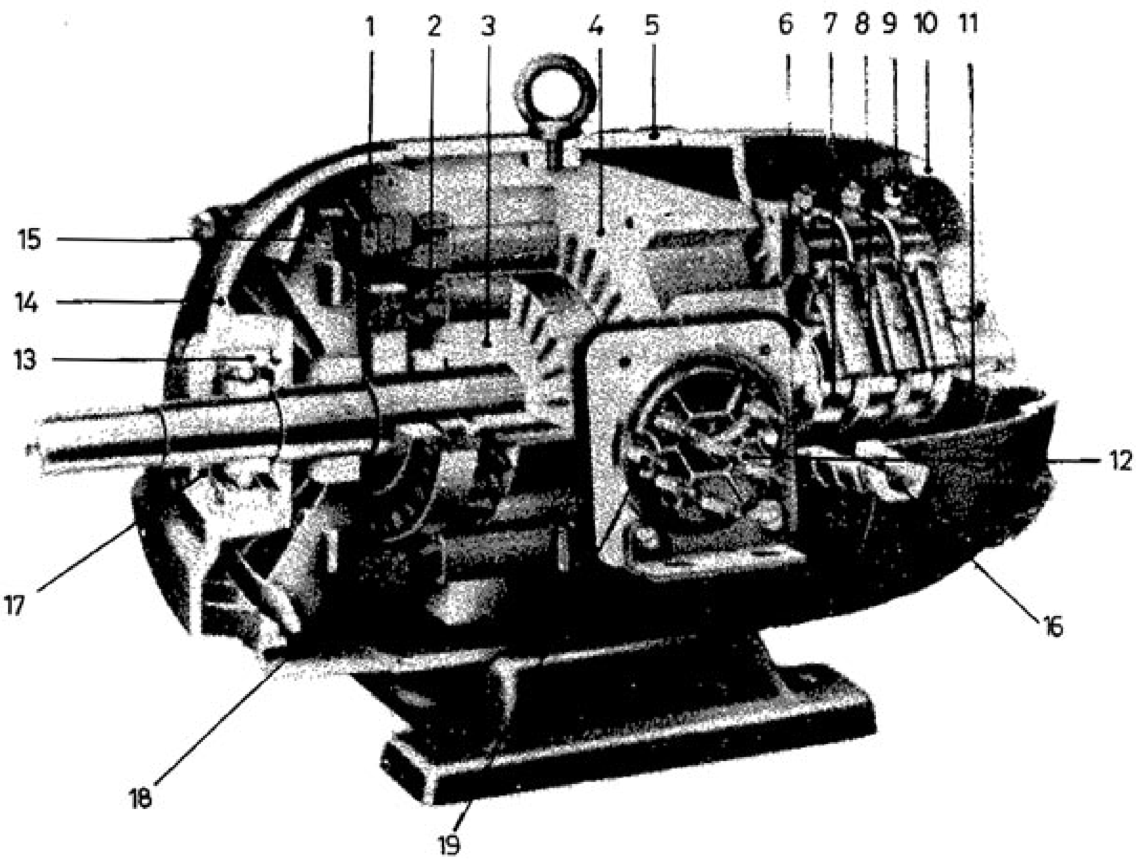


1. A squirrel cage induction motor.
2. A slip ring induction motor.
3. A wound rotor synchronous motor.
4. A salient pole synchronous motor.
5. A synchronous convertor.

AC–M 6.2 With which of the following lubricants is part 13 of the motor shown to be lubricated?

1. Graphite
2. Grease
3. Silicon oil
4. Mineral oil
5. Vegetable oil

AC–M 7.1 Which of the following statements about the connection of the protective conductor to the motor shown in the figure is correct?



1. No protective conductor is needed for this motor.

2. The protective conductor is connected to terminal X in case of star connected stator windings.

3. The protective conductor is connected to terminal X and 19 in case of star connected stator windings.

4. The protective conductor is connected to terminal X in case of delta connected stator windings.

5. The protective conductor can only be connected to the terminal marked 19.

AC–M 8.1 An induction motor is running at its rated torque. The applied voltage is reduced from the rated value of 380 V to 320 V. What is the consequence of this?

1. After some time the motor heats up to an inadmissible extent.
2. The current decreases.
3. The motor stops.
4. The speed reduces considerably.
5. The speed increases a little.

AC–M 8.2 Which of the following formulae is used to calculate the synchronous speed of an induction motor?

1. $n_s = p \times f$
2. $n_s = \frac{60 \times p}{f}$
3. $n_s = \frac{60 \times f}{p}$
4. $n_s = \frac{f \times p}{60}$
5. $n_s = \frac{50 \times f}{p}$

AC–M 8.3 An induction motor has a rated speed of 715 rpm. How many poles has its rotating magnetic field?

1. 2 poles
2. 4 poles
3. 6 poles
4. 8 poles
5. 10 poles

AC–M 8.4 The rated speed of an induction motor is 1410 rpm. What is meant by the statement "the slip s = 1"?

1. The speed of the motor is higher than the synchronous speed.
2. The motor runs at a synchronous speed.
3. The motor runs at its rated speed.
4. The rotor is stationary.
5. The rotor rotates in a direction opposite to that of the magnetic field at a speed of 1410 rpm.

AC–M 9.1 A machine is driven by an induction motor running at nominal speed. What happens if the counter torque of the machine becomes larger than the maximum torque of the motor?

1. The induction motor heats up to an inadmissible extent.
2. The induction motor stops.
3. The speed of the induction motor is reduced to less than half of its nominal speed.
4. The winding of the motor can be damaged because of high current strength.
5. The motor keeps running, but draws a much too high current from the mains.

AC–M 9.2 What is the disadvantage of starting an induction motor with a star–delta starter?

1. The starting torque increases and the motor runs with jerks.

2. The starting torque is one third of the torque in case of the delta connection.

3. By changing over from star to delta connection a voltage peak is produced which endangers the insulation of the motor.

4. During starting high losses are produced.

5. The starting process is of longer duration as compared to that of a slipring motor with rotor starter.

AC–M 9.3 An induction motor is started on the 220/380 V supply mains with the help of a star–delta starter. Which type of induction motor is this?

1. 220/380 V squirrel cage induction motor.
2. 220/380 V slipring induction motor.
3. 380/660 V squirrel cage induction motor.
4. 380/660 V slipring induction motor.
5. 500/865 squirrel cage induction motor.

AC–M 10.1 What is the advantage of starting a slipring induction motor | with the help of rotor resistances as compared to other methods?

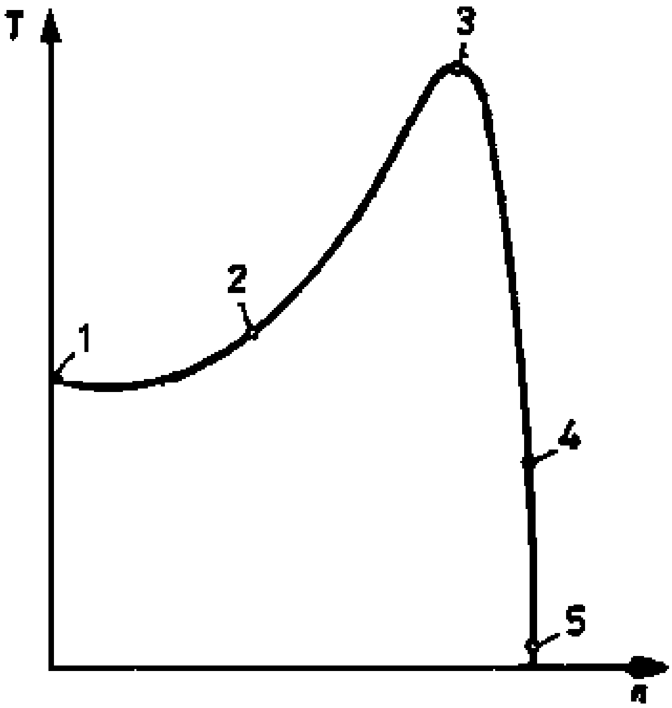
1. The starting current is reduced.
2. The starting torque increases due to the rotor resistances.
3. The starter has to be designed for only a very low current.
4. The starter can, be built directly into the motor.
5. The starting process takes less than one second even in case of a large motor.

AC–M 10.2 What is the advantage of the double squirrel cage rotor as compared to the round bar cage rotor?

1. The efficiency of the motor is higher.
2. The power factor of the motor is higher.
3. The slip of the motor is larger.

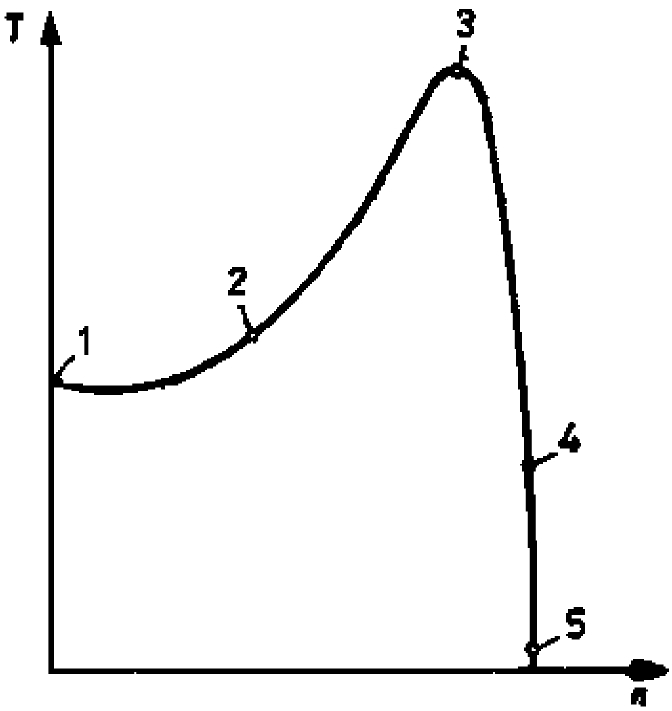
4. The starting current of the motor is lower.
5. The motor runs very smoothly.

AC–M 10.3 The figure shows the characteristics of an induction motor. What is the torque marked 1 called?



1. Maximum torque
2. Starting torque
3. Rated torque
4. Frictional torque
5. Acceleratory torque

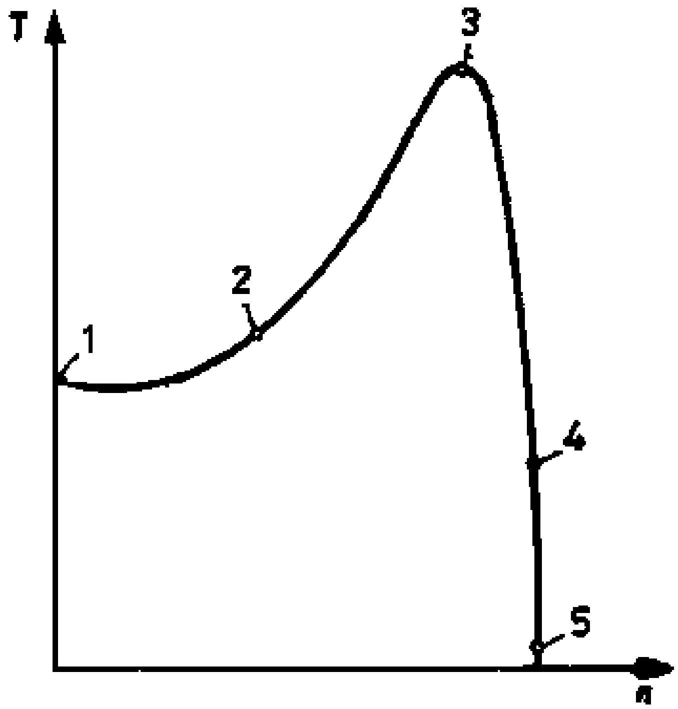
AC–M 11.1 The figure shows the characteristics of an induction motor. What is the torque marked 3 called?



1. Starting torque
2. Acceleratory torque
3. Maximum torque

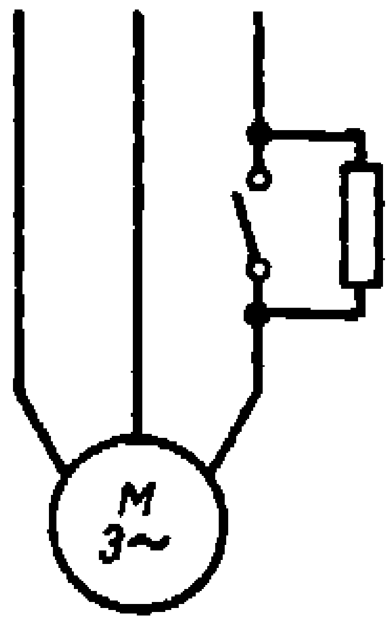
4. Rated torque
5. Frictional torque

AC–M 11.2 The figure shows the characteristics of an induction motor. At which point does the motor operate after starting and accelerating at the rated torque?



1. Point 1
2. Point 2
3. Point 3
4. Point 4
5. Point 5

AC–M 11.3 What is the use of the circuit shown in the diagram?



1. To reduce the starting current to a very low value.
2. To achieve a smooth starting.
3. To attain a higher starting torque.
4. To attain a higher maximum torque.
5. To decrease the rated speed.

AC–M 12.1 Which of the following connections is correct for the anticlockwise rotation of an induction motor?

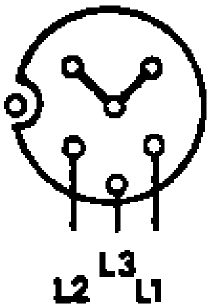


figure 1

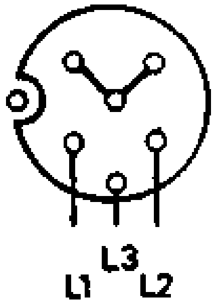


figure 2

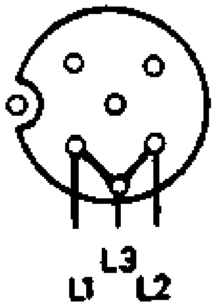


figure 3

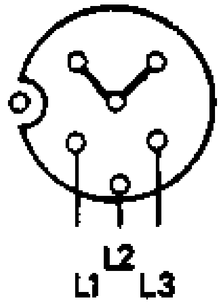


figure 4

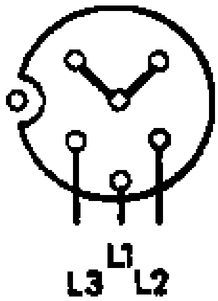


figure 5

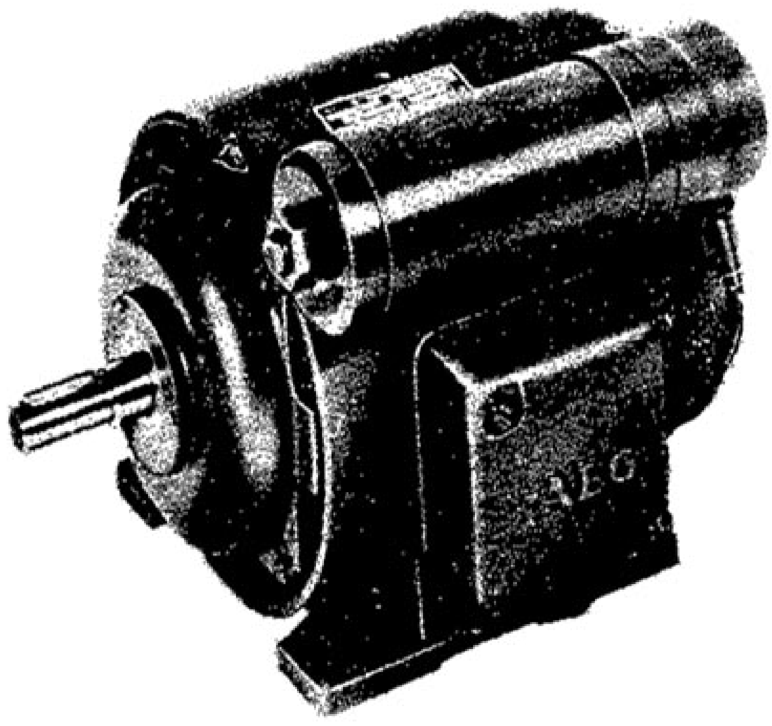
AC–M 12.2 What is the disadvantage of the speed control of a slipring induction motor with the help of resistances in the rotor circuit?

1. This method of speed control is only applicable to motors having a power of more than 100 kW.
2. This method is associated with high losses.
3. By using this method the speed can only be controlled very broadly.
4. With reductions in speed the torque decreases considerably.
5. The speed can only be reduced upto 10 % below the rated speed.

AC–M 12.3 A three phase induction motor is running at a load of the rated torque. What happens when one of the outer mains is interrupted while the motor is running?

1. The motor stops immediately.
2. The motor stops after a few seconds.
3. The motor keeps running but draws more current.
4. The motor keeps running and the current drawn does not change.
5. The motor keeps running, but the voltage across the winding is higher which endangers the insulation.

AC–M 13.1 What does the figure represent?



1. A three phase commutator motor with anti–interference capacitor
2. A three phase induction motor with anti–interference capacitor
3. A three phase induction generator with exciting capacitor

4. A single phase induction motor
5. An universal motor with anti–interference capacitor.

AC–M 13.2 Figure A represents a circuit for clockwise rotation of a motor. Which of the following figure represents the circuit for anti–clockwise rotation of the motor?

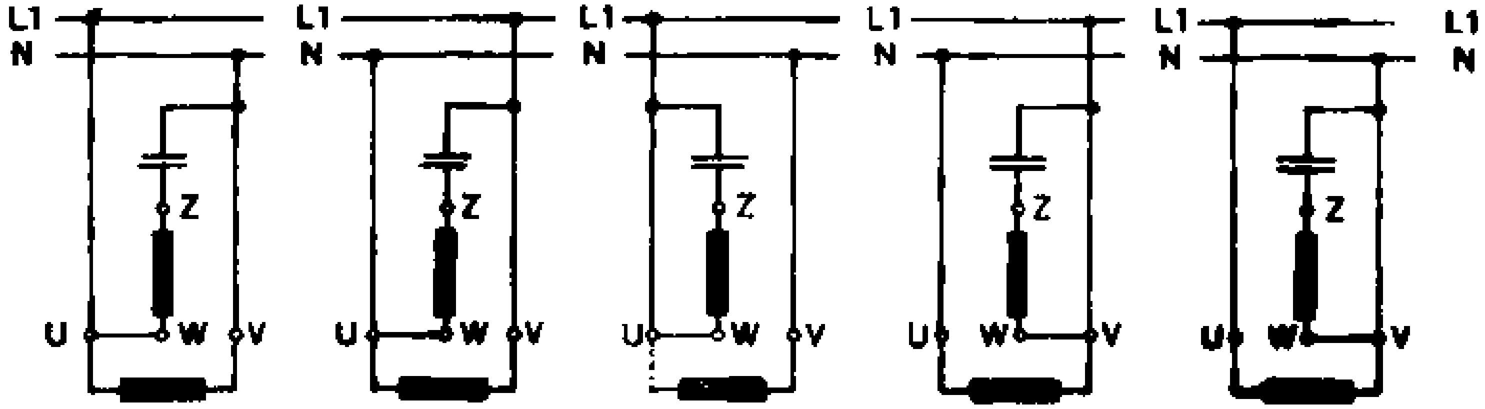


figure A	figure 1	figure 2	figure 3	figure 4

AC–M 13.3 While starting an induction motor with star–delta starter at the star position

1. the torque developed is 3 times as high as at the run position.
2. the torque developed is $\sqrt{3}$ times as high as at the run position.
3. the voltage per phase is $\frac{1}{\sqrt{3}}$ of the supply voltage.
4. the current is $\frac{1}{\sqrt{3}}$ of the current at direct on line starting.

AC–M 14.1 Synchronous speed is defined as

1. the speed of the rotor of an induction motor.
2. the speed of a synchronous motor.
3. the speed of an induction motor at no load.
4. the speed of an induction motor at full load.
5. the natural speed at which a magnetic field rotates.

AC–M 14.2 The direction of rotation of a three phase induction motor is reversed by

1. interchanging the connection of any two phases.
2. interchanging the connection of all the three phases.
3. rewinding the stator.
4. adding a capacitor in any phase.
5. adding an inductor in any phase.

AC–M 14.3 The exciting field coil of an alternator is generally excited by

1. a separate D. C. generator driven by some source.
2. a separate A.C. generator driven by some source.
3. a D.C. generator coupled directly to the alternator shaft.
4. a battery.
5. the alternator itself.

AC–M 14.4 Which of the following statements is true?

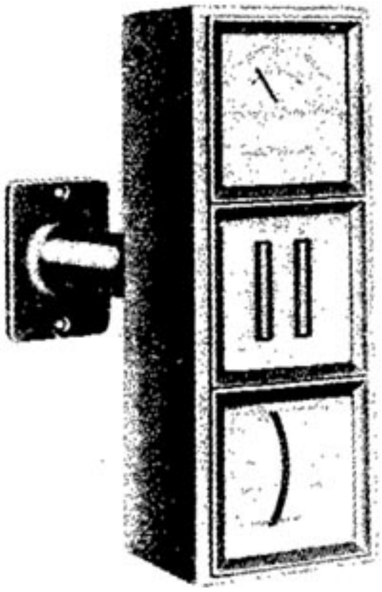
1. An internal pole dynamo has a rotating magnetic field.
2. An internal pole dynamo has a rotating armature.

3. An external pole dynamo has a rotating magnetic field.
4. Alternators are usually of the external pole type.

AC–M 15.1 For which of the following cases are synchronous machines used exclusively?

1. For electric trains
2. For cranes
3. For machine tools
4. For large three phase generators
5. As starters for motor vehicles

AC–M 15.2 Where is the shown wall bracket of measuring instruments used?



1. To synchronize synchronous motors.
2. To synchronize synchronous generators.
3. To synchronize induction motors.
4. To synchronize induction generators.
5. To measure the load on synchronous generators.

AC–M 15.3 What is the use of the bright lamp circuit?

1. It is used during synchronization to indicate equal voltages of generator and line.
2. It is used during synchronization to indicate that generator and line are having the same phase.
3. It is used to start synchronous motors.
4. It is used to Indicate when the power factor of a synchronous motor is exactly 1.
5. It indicates when the generator has started supplying power into the system.

AC–M 16.1 A four–pole turbo–generator supplies a 50 Hz network. What should be the speed of the generator?

1. 6000 rpm
2. 3000 rpm
3. 1500 rpm
4. 1000 rpm
5. 750 rpm

AC–M 16.2 To which type of current can a universal motor be connected?

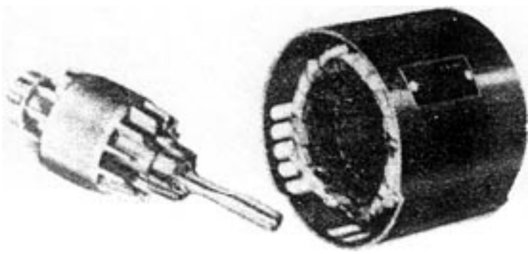
1. Alternating current only.
2. Direct current only.
3. Three phase alternating current only.
4. Alternating and direct current.
5. Battery current only.

AC–M 16.3 What is the advantage of a synchronous motor as compared to an induction motor?

1. The speed of the synchronous motor can be regulated more easily.
2. The synchronous motor has a much higher efficiency.
3. The synchronous motor can withstand high overloads of short durations.
4. It can be operated at unity power factor and it can even supply reactive power.
5. No direct voltage is required for excitation in case of a synchronous motor.

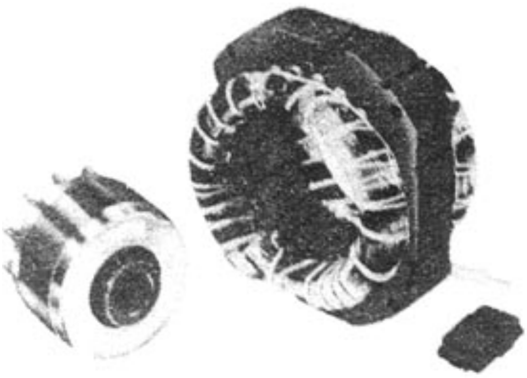
AC–M 16.4 Which of the following is not part of a squirrel cage induction motor?

1. Rotor
2. Stator
3. Carbon brushes
4. Shaft
5. End plates

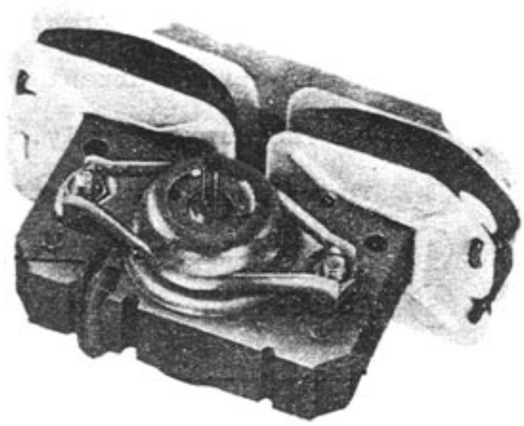


1

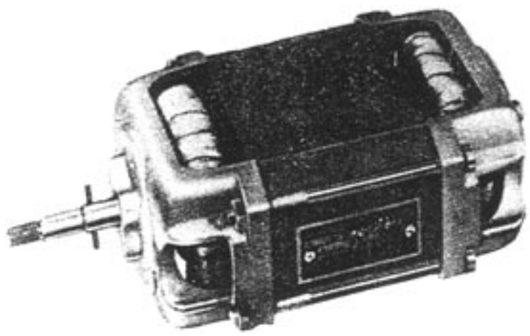
2



3



4

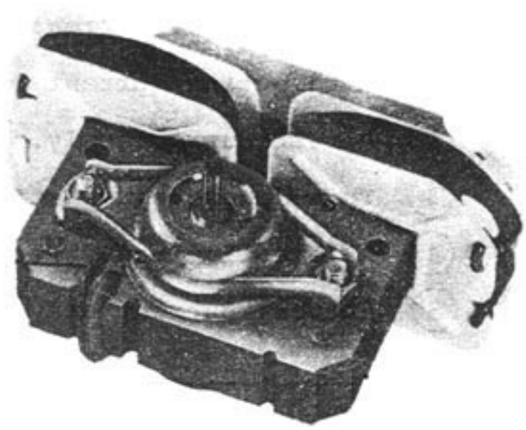


5

AC–M 17.1 Which of the above figures shows a shaded pole motor?

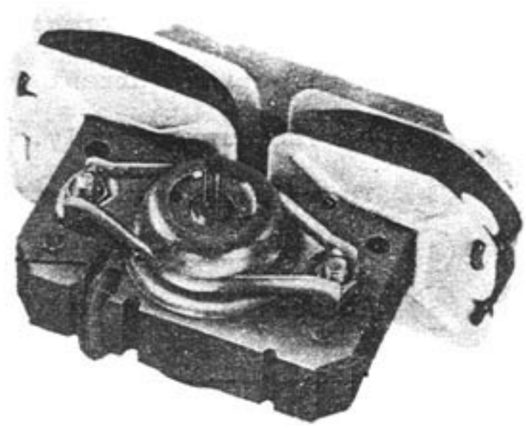
AC–M 17.2 Which of the above figures represents a universal motor?

AC–M 18.1 Which of the following statements about part 1 in the figure is true?



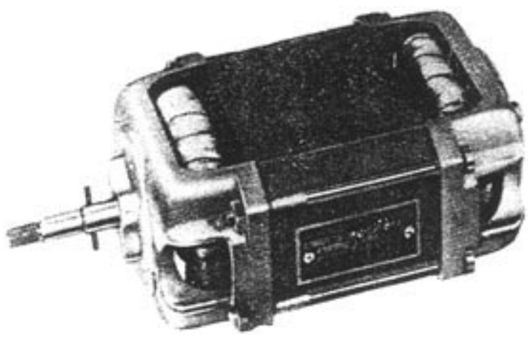
1. The rings consist of soft magnetic iron.
2. The rings produce a lagging magnetic flux.
3. The rings increase the efficiency.
4. The rings improve the smooth running.

AC–M 18.2 What does the figure represent?

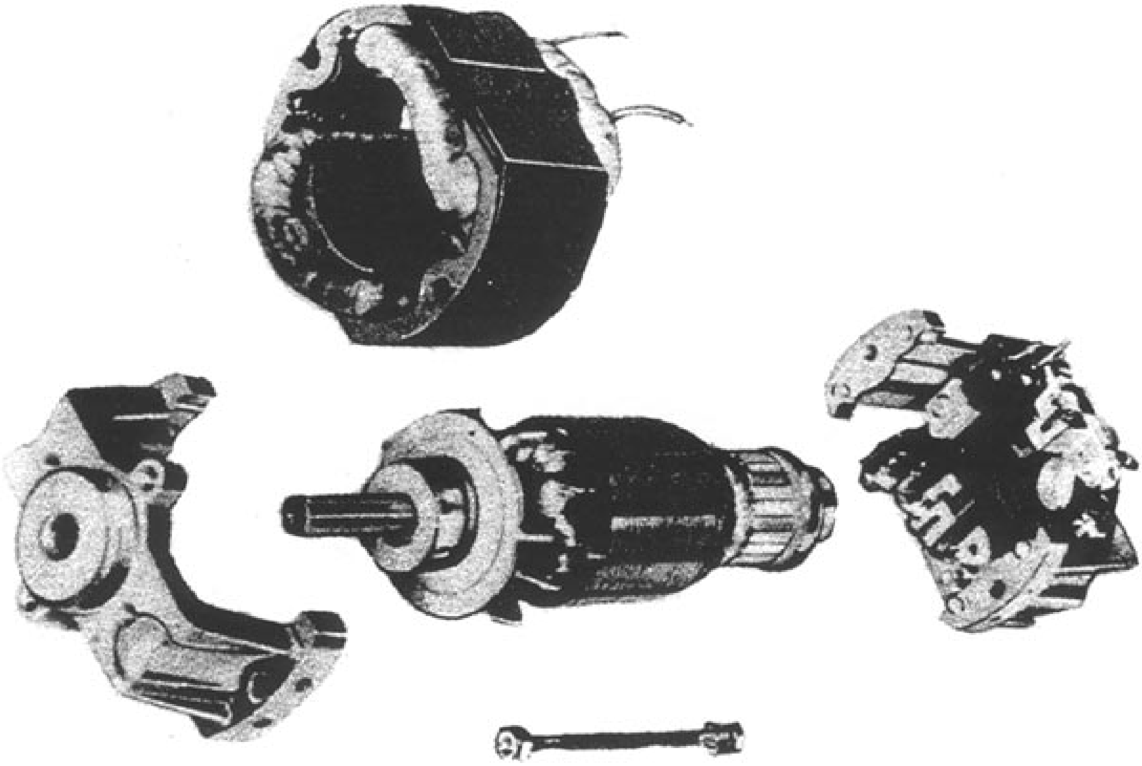


1. A single phase induction motor.
2. A magnetic rotor motor.
3. A reluctance motor.
4. A universal motor.
5. A shaded pole motor.

AC–M 18.3 What does the figure represent?



1. A universal motor.
2. A D.C. motor.
3. A shaded pole motor.
4. A single phase induction motor.
5. A magnetic rotor motor.



AC–M 19.1 What type of motor is shown in the figure above?

1. A shaded pole motor
2. A hysteresis motor
3. An induction motor
4. A D.C. motor
5. A universal motor

AC–M 19.2 Which of the following statements about the motor shown in the above figure is true?

1. The motor has a high starting torque.
2. There is little change in speed with a change in the load.
3. The highest no–load speed cannot exceed 3000 rpm.
4. The speed of the motor cannot be regulated.
5. The motor runs noiselessly.

AC–M 19.3 For which of the following applications is the motor shown in the above figure most suitable?

1. Record player.
2. Hand operated drilling machine.
3. Table fan.
4. Tape recorder.
5. Compressor of a refrigerator.

Illumination

Il 1.1 Which of the following quantities has the unit "lux"?

1. Utilization factor.
2. Luminous intensity.
3. Brightness (luminance).
4. Luminous flux.
5. Illumination.

Il 1.2 Which of the following statements about illumination is true?

1. If the distance from the source doubles, the illumination becomes half.
2. If the distance from the source doubles, the illumination reduces to one fourth.
3. The greater the illumination, the better one sees.
4. The finer the work, the less the required illumination.
5. The greater the illumination, the more the dazzle.

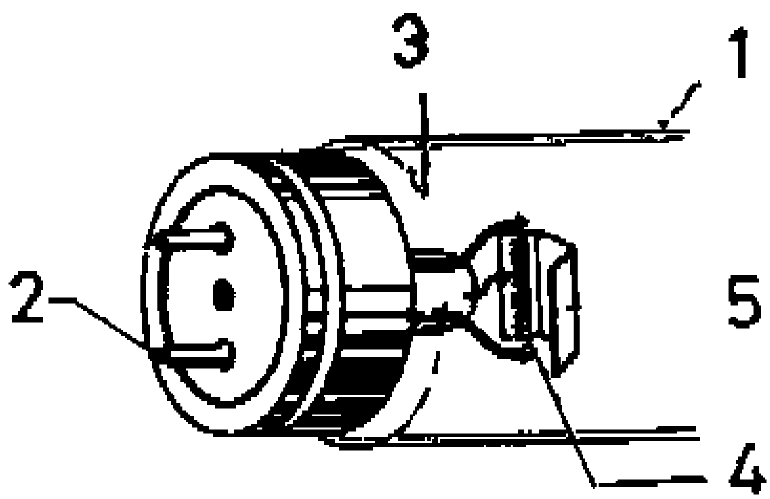
II 1.3 For which of the following work is the highest illumination required?

1. For office work.
2. For mounting of wrist watches.
3. For sorting work in the stores.
4. For painting work.
5. For forging at the anvil.

II 1.4 Which of the following comparisons between the filament lamp and the fluorescent lamp is correct?

1. The fluorescent lamp has a higher dazzle.
2. The fluorescent lamp produces sharper shadows.
3. The fluorescent lamp produces greater brightness.
4. The luminous efficiency of the fluorescent lamp is less.
5. The average life of the fluorescent lamp is five to seven times higher.

II 2.1 What is the average life of a normal filament lamp?



1. 10 000 hours
2. 5 000 hours
3. 1 000 hours
4. 500 hours
5. If it is used properly it can have unlimited life.

II 2.2 What is attained by heating the electrodes of the fluorescent lamp?

1. The thermionic emission of electrons.
2. The photo emission of electrons.
3. The heating up of the gas filling and thus the creation of ions.
4. An increase in the voltage across the electrodes.
5. An increase in the electric field strength near the electrode marked 5.

II 2.3 What is the process taking place in a fluorescent tube called?

1. Gaseous discharge.
2. Phosphorescence.
3. Temperature radiation.
4. Secondary emission.
5. Thermionic emission.

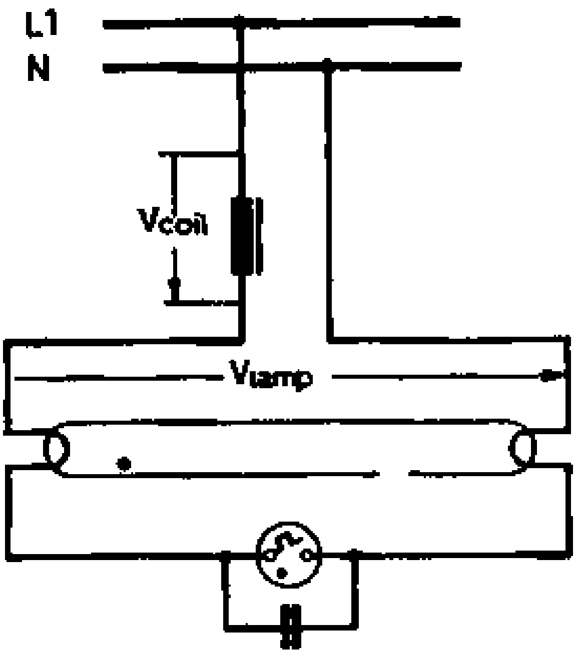
II 2.4 What is the difference between fluorescent lamps that produce different coloured light?

1. The colour of the glass.
2. The composition of the fluorescent material.
3. The pressure of the filled gas.
4. The composition of the filled gas.
5. The voltage between the electrodes.

II 3.1 What is the use of the white matter coated inside the fluorescent lamp?

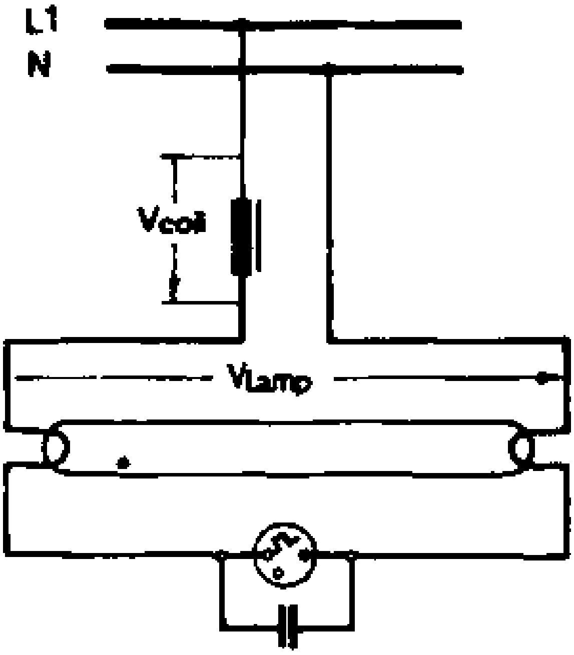
1. It reduces the brightness.
2. It provides a proper exterior to the tube.
3. It converts the ultraviolet radiation into visible light.
4. It provides the ions necessary for the gas discharge.
5. It is used to start the fluorescent tube.

II 3.2 What is the function of the choking coil in the circuit of the figure shown?



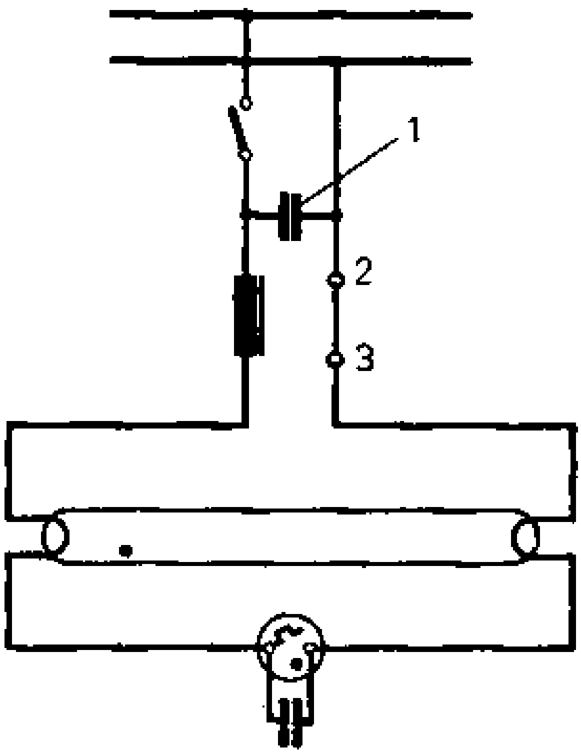
1. Only to limit the operating current.
2. Only to produce the starting voltage impulse.
3. To produce the starting voltage impulse and to limit the operating current.
4. To limit the heating current.
5. To compensate for the phase difference produced due to the capacitive behaviour of the tube.

II 3.3 What is the approximate power factor of the fluorescent lamp (including starting device) shown in the figure?

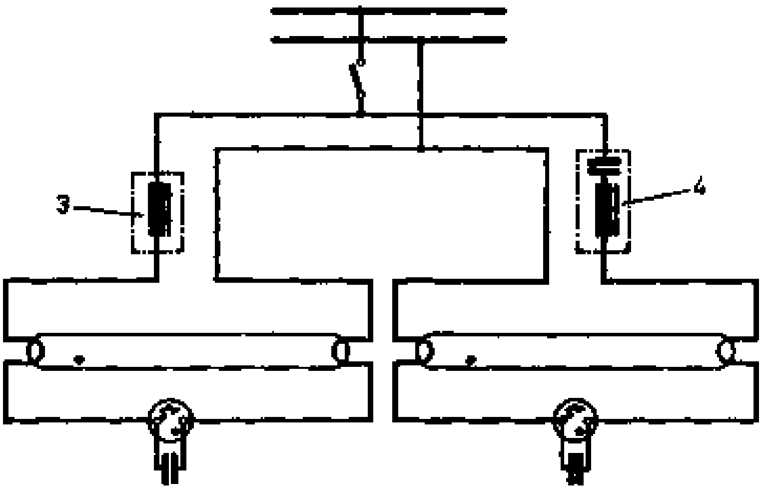


1. cos ? = 0 cap.
2. cos ? = 0.5 cap.
3. cos ? = 1
4. cos ? = 0.5 ind.
5. cos ? = 0 ind.

II 4.1 What is the function of the capacitor marked 1 in the circuit shown?



1. To eliminate interference of the fluorescent tube.
2. To produce the starting voltage.
3. To limit the operating current.
4. To compensate for the phase difference caused by the choking coil.
5. To protect the fluorescent lamp from overvoltages of the mains.



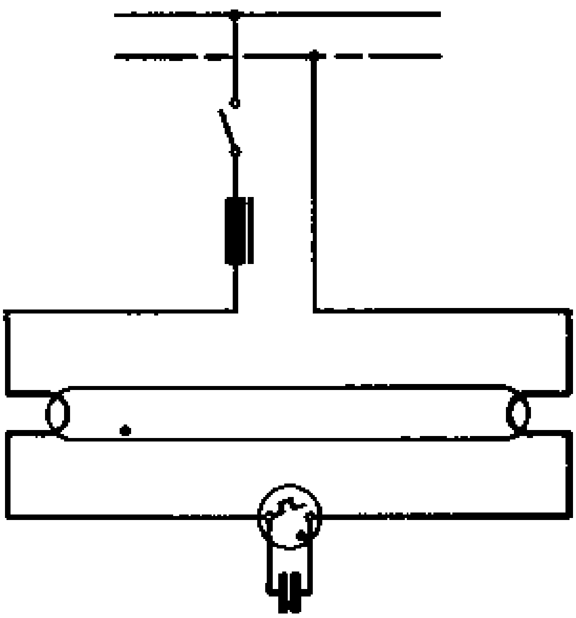
II 4.2 What is the advantage of the circuit shown in the above figure?

1. The true power consumed in the circuit is almost zero.
2. The power factor of the circuit is 0.5 leading.
3. A very small current flows in both the branches.
4. The total current drawn by the circuit is almost zero.
5. The power factor is 1 and the light does not flicker.

II 5.1 A fluorescent lamp flickers. Why should the lamp be immediately switched off?

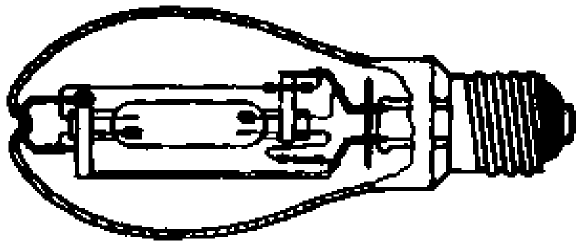
1. The choking coil or the starter can be damaged.
2. A strong interference is produced in radio receivers.
3. Due to voltage peaks other lamps might also be damaged.
4. The lamp can cause a short circuit.
5. The lamp can explode.

II 5.2 What is the function of the capacitor in the circuit?



1. To increase the heating current
2. To reduce the heating current
3. To compensate for the phase difference caused by the choke.
4. To produce the starting voltage impulse.
5. To eliminate radio−interference caused by the starter.

II 5.3 What does the figure show?



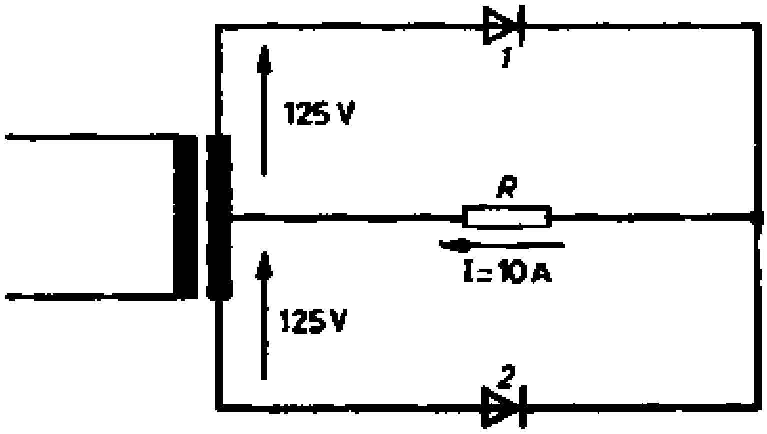
1. Sodium vapour lamp.
2. Zenon lamp.
3. Mercury vapour lamp.
4. Halogen lamp.
5. Neon lamp.

II 5.4 The choking coil of an operating fluorescent lamp is short circuited. What is the consequence?

1. The fluorescent lamp goes out immediately.
2. The lamp becomes brighter.
3. The lamp becomes less bright.
4. The current becomes so large that it damages the fluorescent lamp.
5. The short circuit is noticed only after the lamp is switched on again.

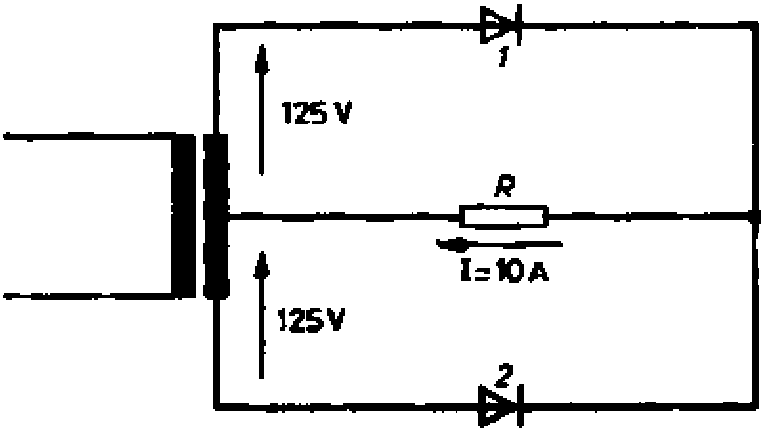
Rectifiers

R 1.1 What is the rectifier circuit shown in the figure called?



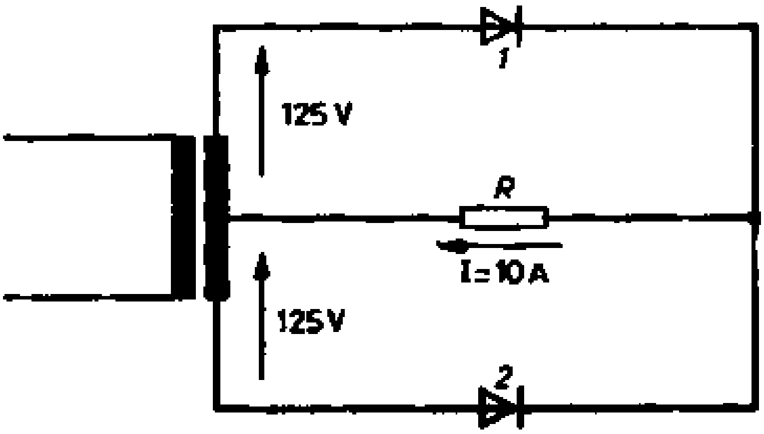
1. Star point circuit
2. Half wave rectifier circuit
3. Middle point circuit
4. Bridge circuit
5. Graetz circuit

R 1.2 A voltage of 125 V is produced between the middle point tapping and the outer terminals of the transformer shown in the figure. How many 25 V selenium plates should be connected in series in the rectifier 1?



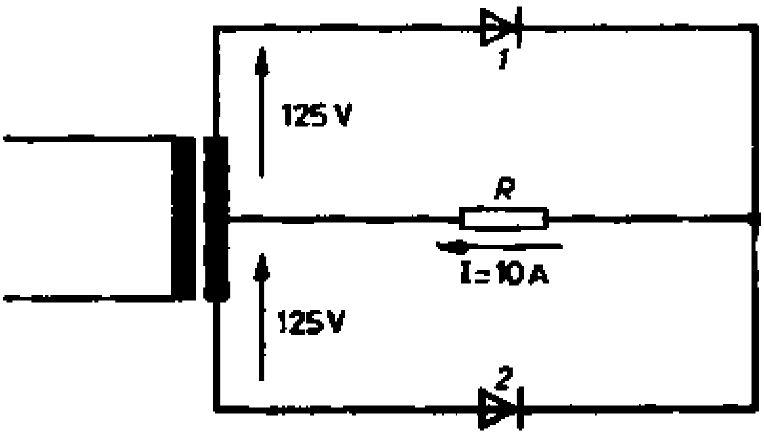
1. 5 plates
2. 10 plates
3. $\frac{125V \times 1.41}{25V} \approx 7 \text{plates}$
4. $\frac{220V \times 1.41}{25V} \approx 14 \text{plates}$
5. 2.5 ? 3 plates

R 1.3 A direct current of 10 A is to flow through the resistance R. For which current is the rectifier 1 to be designed?



1. For 2.5 A
2. For 5 A
3. For 10 A
4. For 14.1 A
5. For 15 A

R 2.1 What is the advantage of the rectifier circuit shown over the half wave rectifier circuit?



1. The rectifiers need to be designed for half the voltage only and thus fewer diode plates are needed.

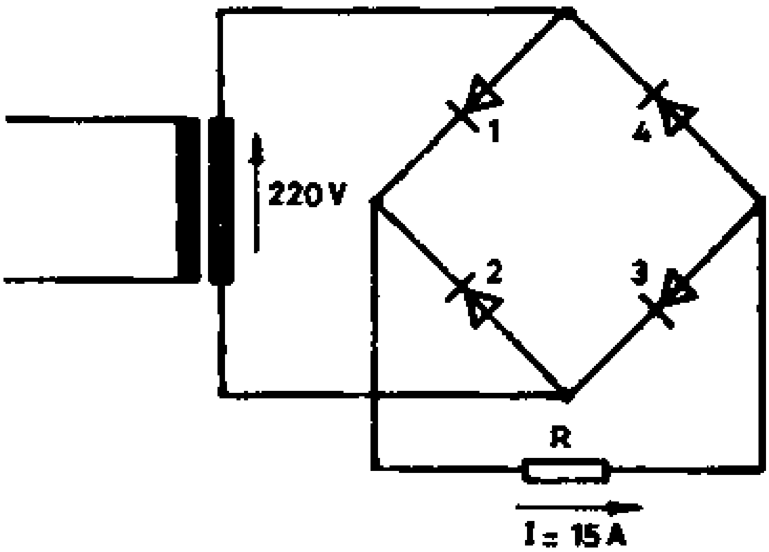
2. The rectifiers need to be designed for half the current only and thus the required plate surface is less.

3. The direct voltage is smoother.

4. The circuit is less sensitive to over currents.

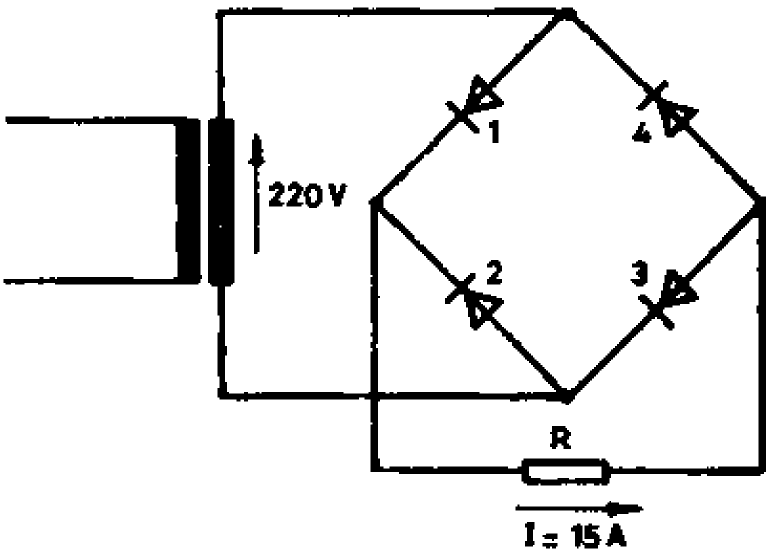
5. The circuit is less sensitive to high voltages.

R 2.2 What is the rectifier circuit shown in the figure called?



1. Bridge circuit
2. Full wave circuit
3. Star point circuit
4. Quadrangle circuit
5. Middle point circuit

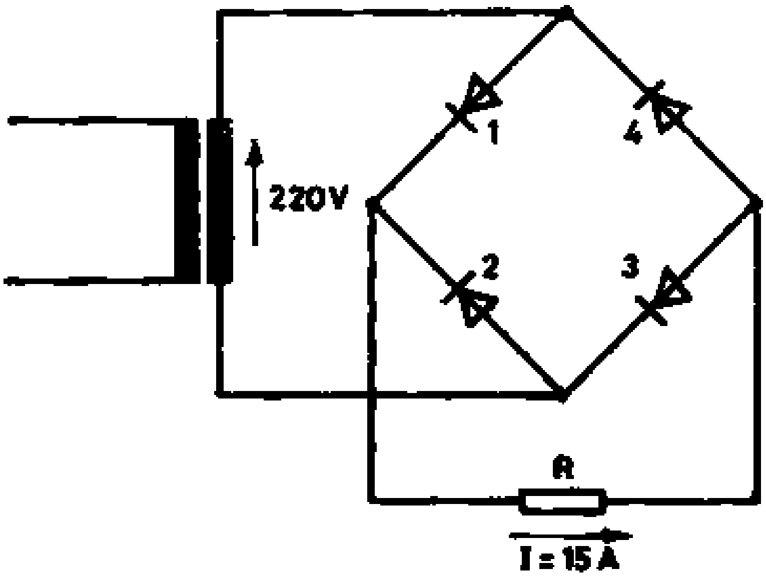
R 2.3 For which nominal terminal voltage are the rectifiers 1....4 designed?



1. $220V \times \sqrt{2} \approx 310V$
2. 220 V
3. $110V \times \sqrt{2} \approx 155V$
4. 110 V

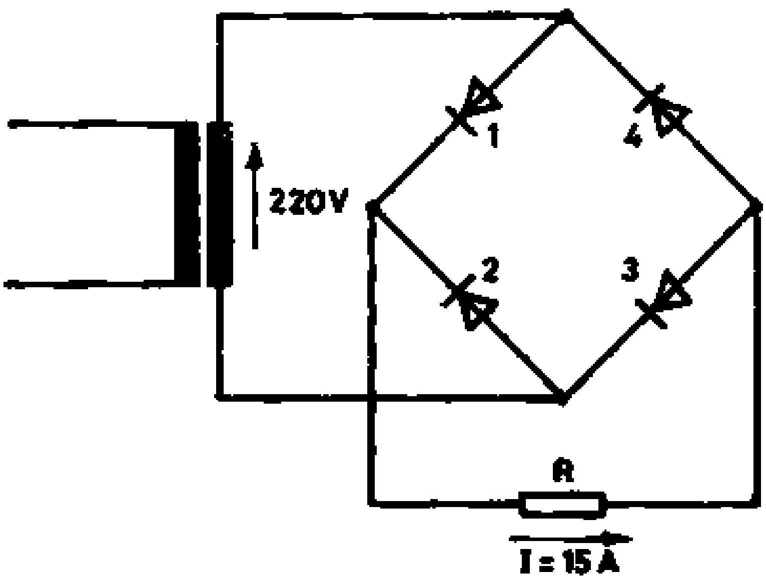
5. 55 V

R 3.1 For which current are the rectifiers 1....4 designed?



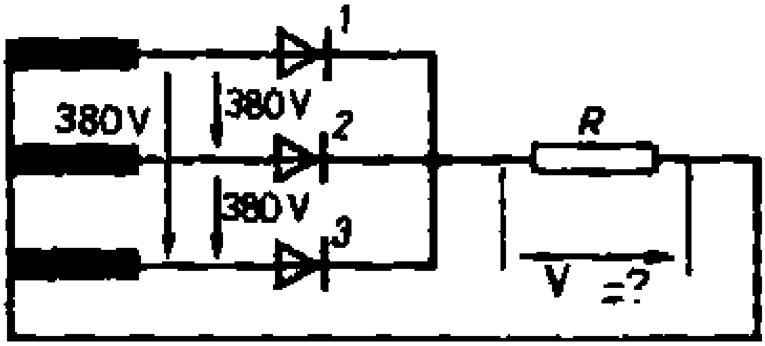
1. 15 A
2. 10 A
3. 7.5 A
4. 5 A
5. 3.75 A

R 3.2 For which current are the rectifiers 1....4 designed?



1. For 1.5 times the required direct current.
2. For the required direct current.
3. For half the required direct current.
4. For 1/4 of the required direct current.
5. For 3/4 of the required direct current.

R 3.3 What is the rectifier circuit shown in the figure called?

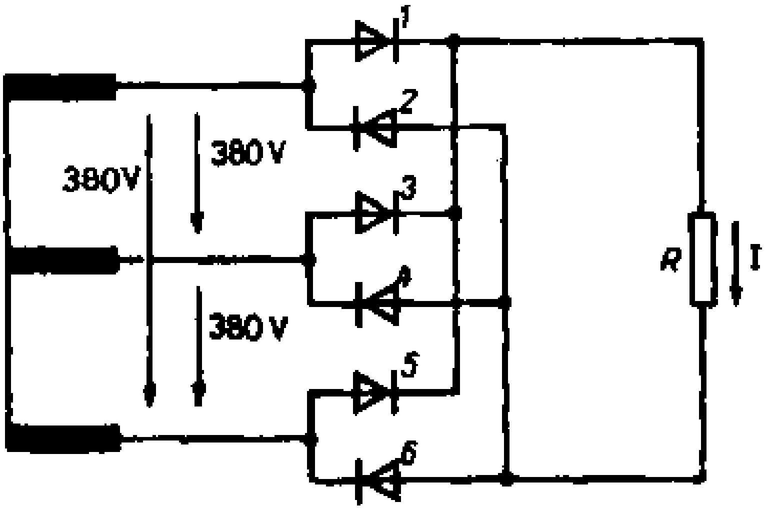


1. Three way rectifier circuit.
2. Three phase parallel rectifier circuit.
3. Star rectifier circuit.
4. Three phase bridge rectifier circuit.
5. Three phase middle point rectifier circuit.

R 3.4 A rectifier

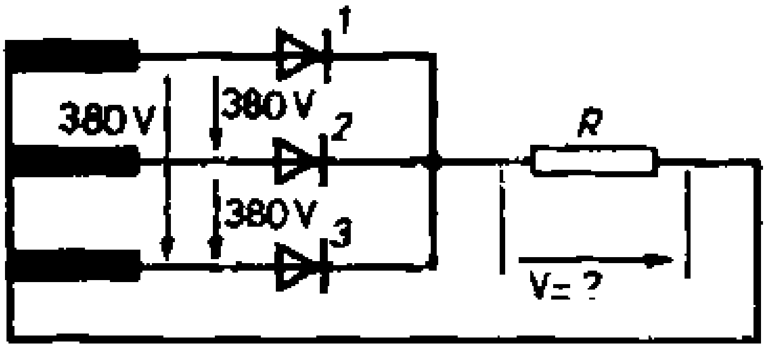
1. converts D.C. to A.C.
2. increases voltage.
3. decreases ripples.
4. converts A.C. to D.C.
5. limits the current.

R 4.1 What is the rectifier circuit shown in the figure called?



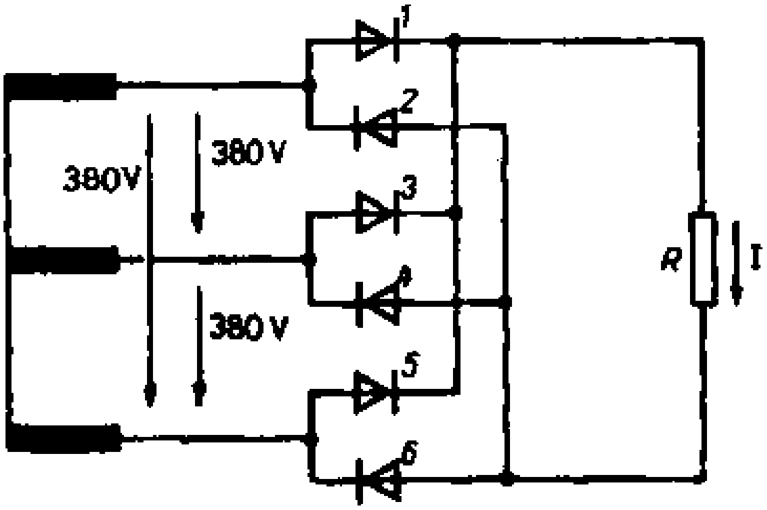
1. Three phase rectifier circuit.
2. Three phase bridge rectifier circuit.
3. Graetz rectifier circuit.
4. Star rectifier circuit.
5. Delta rectifier circuit.

R 4.2 What is the approximate value of the direct voltage appearing across the resistance R shown in the figure?



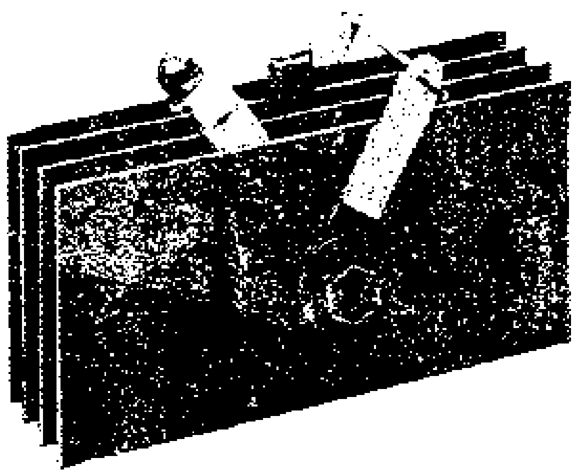
1. 760 V
2. 500 V
3. 380 V
4. 250 V
5. 190 V

R 4.3 For which nominal terminal voltage should each of the rectifiers 1....6 be designed?



1. 127 V
2. 190 V
3. 220 V
4. 380 V
5. 380 × 2 535 V

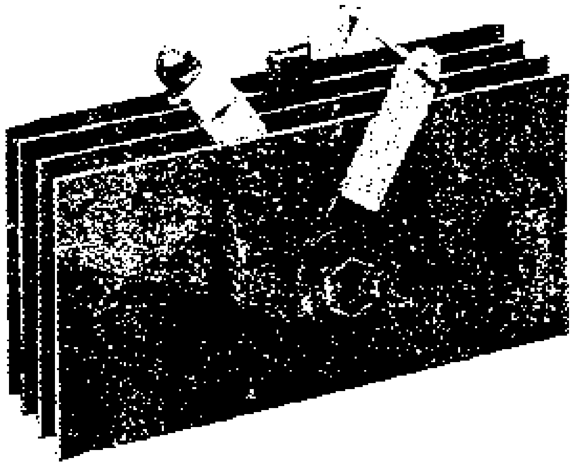
R 4.4 What does the figure represent?



1. Silicon rectifier
2. Selenium rectifier

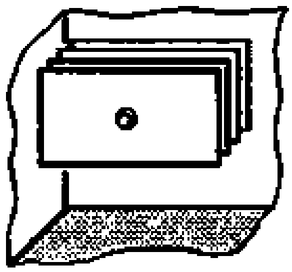
3. Copper oxide rectifier
4. Germanium rectifier
5. Zener diode

R 5.1 How are the plates of the rectifier shown in the figure connected?



1. In a half wave circuit.
2. In a middle point rectifier circuit.
3. In a bridge rectifier circuit.
4. In a three phase star rectifier circuit.
5. In a three phase bridge rectifier circuit.

R 5.2 Upon which of the following factors does the surface area of the plates of a plate recifier depend?



1. Upon the current.
2. Upon the alternating voltage.
3. Upon the direct voltage.
4. Upon the admissible reverse bias current.
5. Upon the reverse bias voltage.

R 5.3 Which of the following is not a metal rectifier?

1. Selenium rectifier
2. Copper−oxide rectifier
3. Mercury arc rectifier
4. Germanium rectifier
5. Silicon rectifier

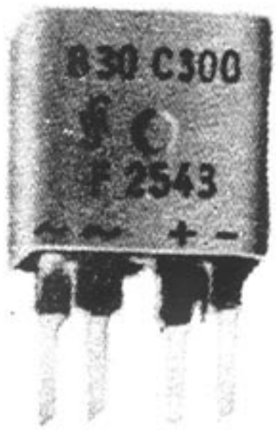
R 5.4 To form a full wave bridge rectifier how many rectifiers are required?

1. one
2. two
3. three
4. four
5. five

R 6.1 In which circuit is the shown rectifier connected?

1. In a half wave rectifier circuit.
2. In a middle point rectifier circuit.
3. In a bridge rectifier circuit.
4. In a star rectifier circuit.
5. In a three phase bridge rectifier circuit.

R 6.2 In which circuit is the shown rectifier connected?



1. In a half wave rectifier circuit.
2. In a middle point rectifier circuit.
3. In a bridge rectifier circuit.
4. In a star rectifier circuit.
5. In a three phase bridge rectifier circuit.

R 6.3 What is the advantage of the selenium rectifier over the silicon rectifier?

1. In the selenium rectifier the losses in the conducting state are less.
2. The reverse bias voltage of the selenium rectifier is higher.
3. The selenium rectifier is less sensitive to over voltages and over currents.
4. The reverse bias current of the selenium rectifier is less.
5. The admissible current density is higher in the selenium rectifier.

Generation & Distribution

G&D 1.1 Which of the following power stations is mainly used to cover peak loads on the system?

1. Brown coal power station
2. Pit coal power station
3. Nuclear power station

4. Hydro−electric−power station
5. Pump storage water power station

G&D 1.2 What is the advantage of hydro−electric power stations over thermal power stations?

1. The initial cost of hydro−electric power stations is low.
2. Their operating cost is low.
3. Hydro−electric power stations can supply the sane power throughout the year.
4. Hydro−electric power stations can be constructed where electric energy is required.
5. No transformer is needed in hydro−electric power stations.

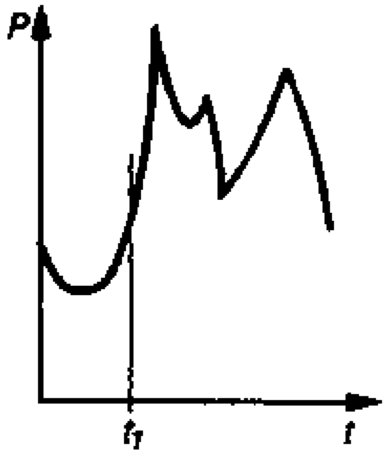
G&D 1.3 Upon which of the following factors does the transmission voltage of a high voltage conductor depend?

1. Only upon the nature of the area.
2. Only upon the transmission distance.
3. Only upon the power to be transmitted.
4. Upon the power to be transmitted and the transmission distance.
5. Upon the nature of the area and the power to be transmitted.

G&D 1.4 Which of the following materials is not used for manufacturing the sheath of power cables?

1. Lead
2. Aluminium
3. Copper
4. Polyvinyle−chloride (PVC)
5. Zinc

G&D 2.1 Which of the following power stations should run even at point t_1 at a high percentage of its rating?



1. Pump storage water power station
2. Nuclear power station
3. Coal power station
4. Thermal power station
5. Hydro−electric power station

G&D 2.2 Which of the following comparisons between a 380 kV transmission line and a 220 kV transmission line is true?

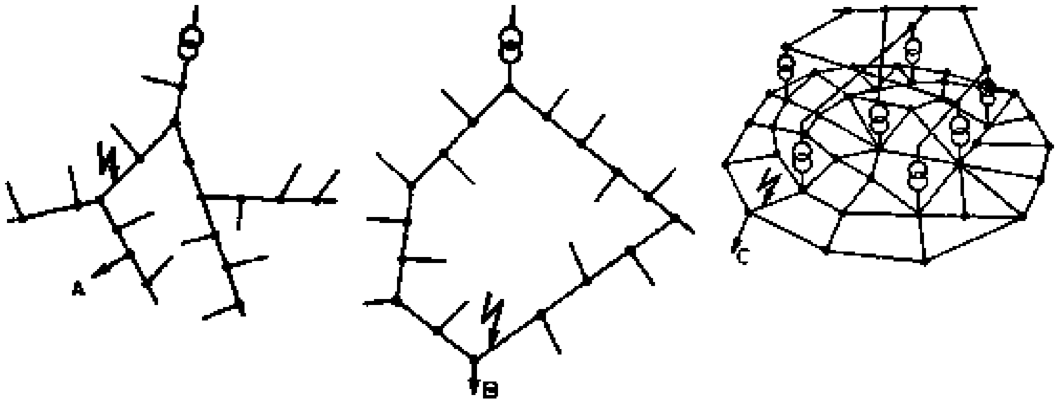
1. In the 380 kV transmission line are the corona losses smaller.
2. The towers for the 380 kV transmission line are smaller.
3. In case of the 380 kV transmission line the clearance is smaller.
4. Much more power can be transmitted over the 380 kV line as compared to the 220 kV line.
5. The 380 kV line is economical for small distances, while the 220 kV line is economical for large distances.

G&D 2.3 What is the advantage of overhead transmission lines as compared to cables?

1. In overhead transmission lines the losses are much less.
2. The installation of overhead transmission lines is cheaper.
3. Overhead transmission lines are more reliable.
4. In overhead transmission lines aluminium can be used, but not in cables.
5. Overhead transmission lines are less risky during winter in case of frost.

G&D 2.4 Which of the following materials cannot be used for contacts of switching devices?

1. Copper
2. Copper alloys
3. Aluminium
4. Silver
5. Silver alloys



a b c

G&D 3.1 Which of the above figures represents a radial transmission system?

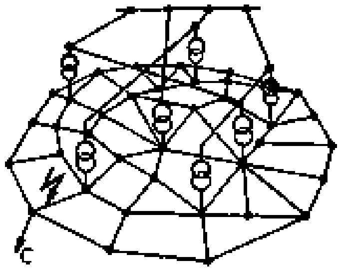
1. Only figure a
2. Figures a and b
3. Figures a and c
4. Only figure c
5. All the figures represent a radial system.

G&D 3.2 The cables have a short circuit at the places marked  in the above figures.

Which of the following statements is true?

1. The energy supply to the consumer A continues.
2. The voltage at the consumer B drops to about half its value.
3. The energy supply to the consumer B is interrupted.
4. The disturbance does not significantly affect consumer C.
5. The energy supply to the consumer C is interrupted.

G&D 3.3 What is the network shown in the figure called?



1. Radial system
2. Low voltage network
3. Ring system

4. Mesh system
5. Combined system

G&D 4.1 An isolating switch is operated under load in an old installation. Which of the following statements is correct?

1. An arc is produced which can destroy the switching section.

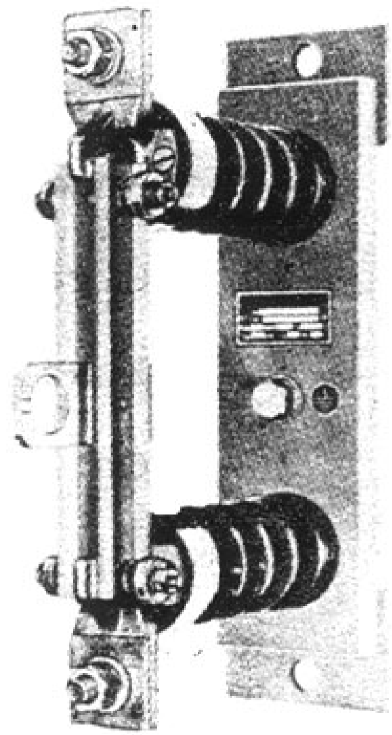
2. If the switch is operated sufficiently fast, the circuit is interrupted correctly.

3. The circuit is interrupted correctly. However, the contacts of the isolating switch must be changed.

4. The nominal current can be interrupted five times with the help of an isolating switch.

5. Isolating switches are always interlocked; they cannot be operated under load by mistake.

G&D 4.2 How is the switch shown in the figure operated?

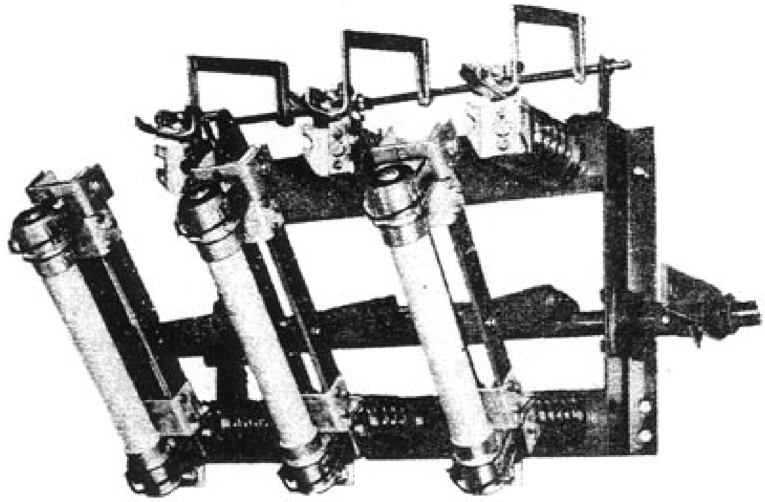


1. By a revolving crank drive.
2. By the help of a switching rod.
3. By the help of a compressed air drive.
4. By the help of a compressed air motor.
5. By the help of an electric motor drive.

G&D 4.3 When is the arc produced by the breaking of an alternating current extinguished?

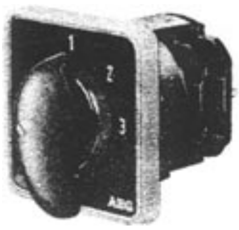
1. When the product of current and voltage, i.e. the power, is the lowest.
2. When the voltage is at its maximum value.
3. When the current is at its maximum value.
4. When the voltage reaches its zero value.
5. When the current reaches its zero value.

G&D 5.1 What does the above figure show?



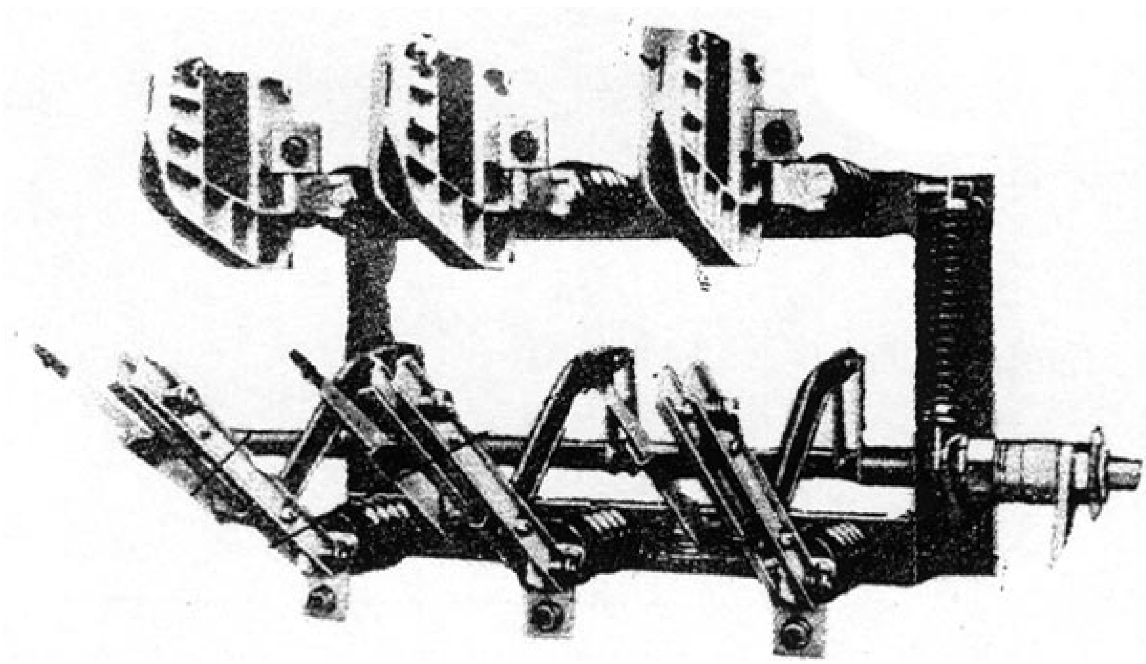
1. Circuit breaker
2. Fuse carrying isolating switch
3. On load isolating switch
4. HH fuses and fuse holder
5. Isolating circuit breaker

G&D 5.2 What does the figure represent?



1. A lever switch
2. A motor protective switch
3. A drum switch
4. A cam−shaft switch
5. An isolating switch

G&D 6.1 What does the figure show?

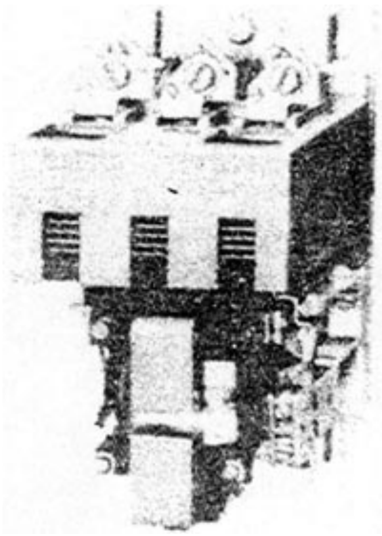


1. Circuit breaker
2. Isolating switch
3. Earthing switch
4. Isolating circuit breaker
5. On load isolating switch

G&D 6.2 What is the switch shown called?

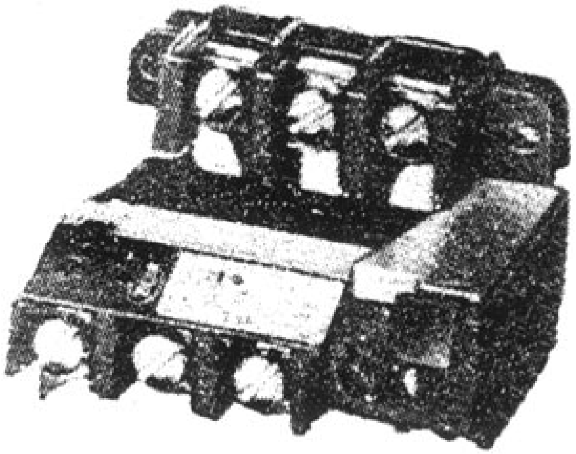
1. Push button
2. Lever switch
3. Cam−shaft switch
4. Small motor protective switch
5. Motor contactor

G&D 6.3 What does the figure represent?



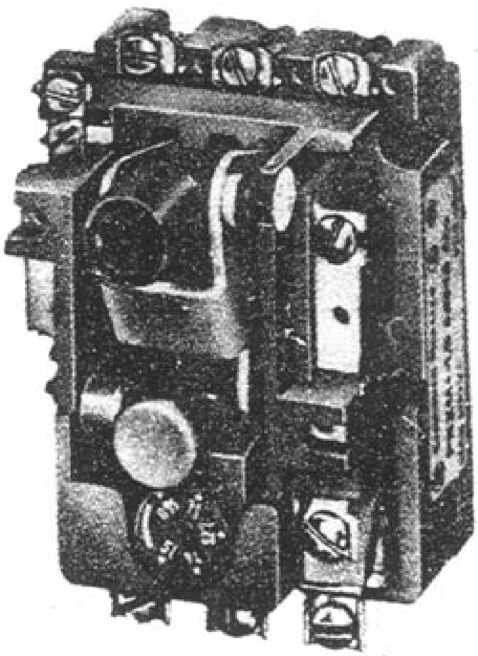
1. A relay
2. A contactor
3. A hand operated circuit breaker
4. An automatic circuit breaker
5. A control contactor

G&D 7.1 What does the figure represent?



1. Auxiliary contactor
2. Short circuit relay.
3. Bimetallic relay
4. Short circuit fast releasing switch
5. Bimetallic releasing switch

G&D 7.2 The switch shown in the figure consists of thermal overcurrent delay relays and overcurrent fast relays. Which of the following statements is true?

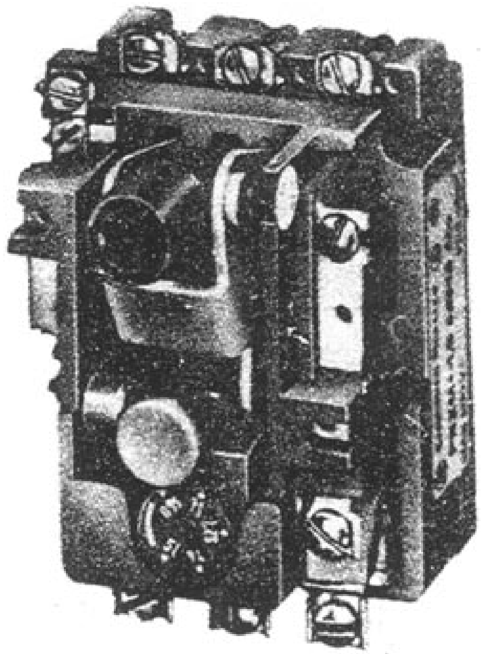


1. The thermal overcurrent delay relays are bimetallic switches.
2. The thermal overcurrent delay relays are based upon the magnetic effect of current.
3. The overcurrent fast relays are bimetallic switches.
4. The thermal overcurrent delay relays as well as the overcurrent fast relays are bimetallic switches.
5. The thermal overcurrent delay relays as well as the overcurrent fast relays are based upon the magnetic effect of current.

G&D 7.3 What can be adjusted by turning screw 1 shown in the above figure?

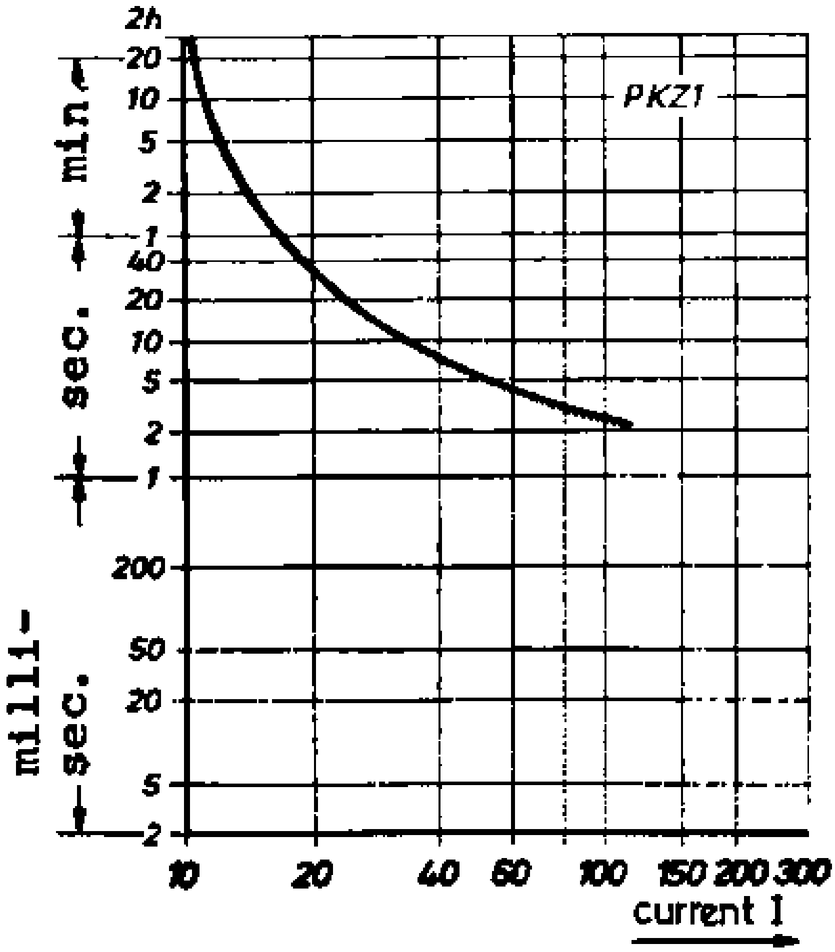
1. The short circuit current.
2. The operating current of the thermal overcurrent delay relays.
3. The operating current of the overcurrent fast relays.
4. The operating time for the rated current of the switch.
5. The operating time for a short circuit current.

G&D 8.1 The screw 1 in the figure is adjusted at 1.4. What current can permanently pass through the switch without operating it?



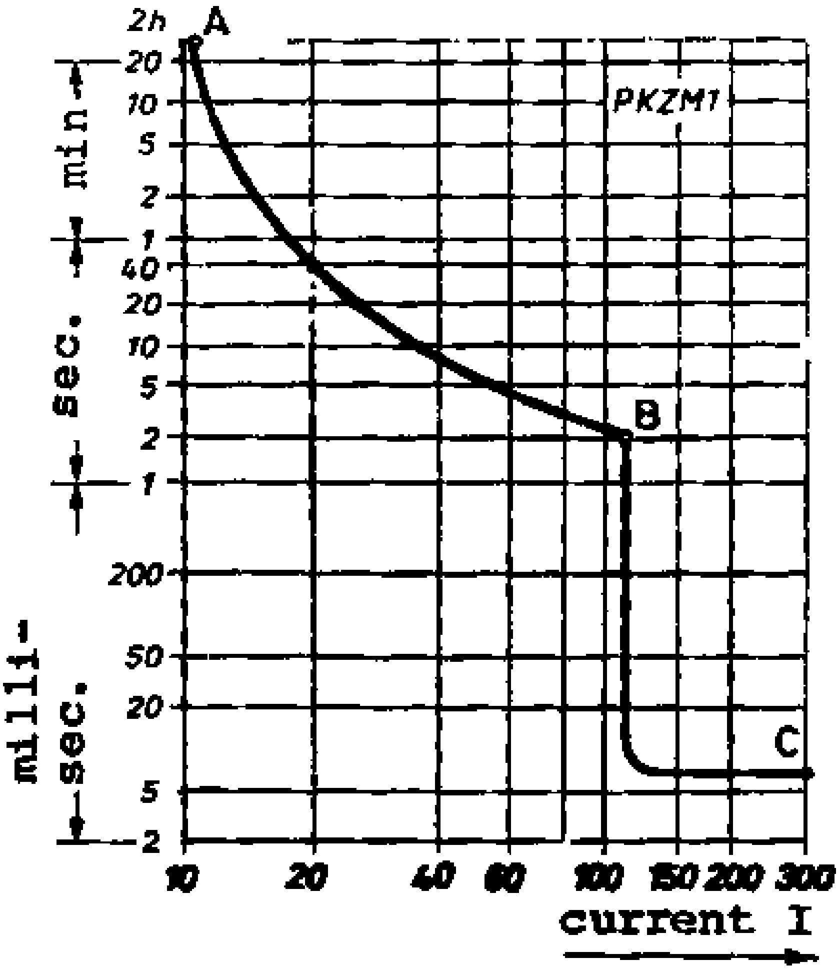
1. 0.95 A
2. 1.1 A
3. 1.25 A
4. 1.4 A
5. 1.5 A

G&D 8.2 The figure shows the characteristic curve of a manually operated motor protective switch. If the relays are adjusted for a nominal current of 10 A, which of the following statements is true?



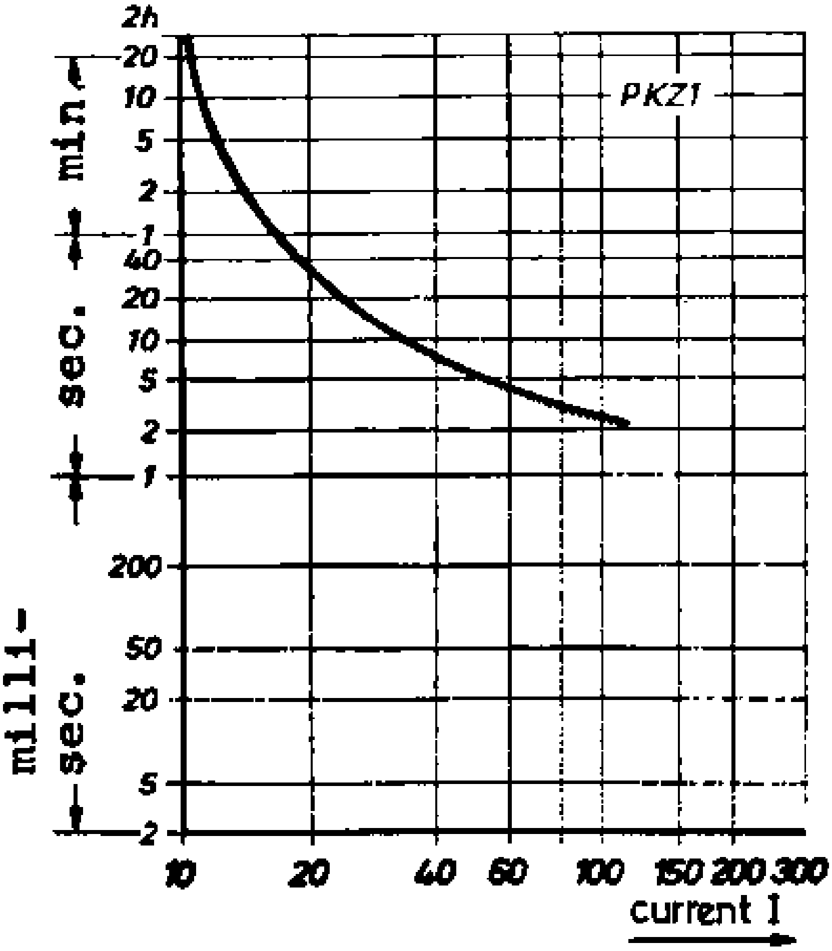
1. The protective switch consits of bimetallic and magnetic relays.
2. The switch limits the current in case of short circuits.
3. At a current of 50 A the switch operates after 5 seconds.
4. A current of 20 A can flow continuously through the switch without operating it.
5. With this switch short circuit currents cannot exceed 100 A.

G&D 9.1 The figure shows the characteristic curve of a manually operated motor protective switch. If the relays are adjusted for a nominal current of 10 A, which of the following statements is true?



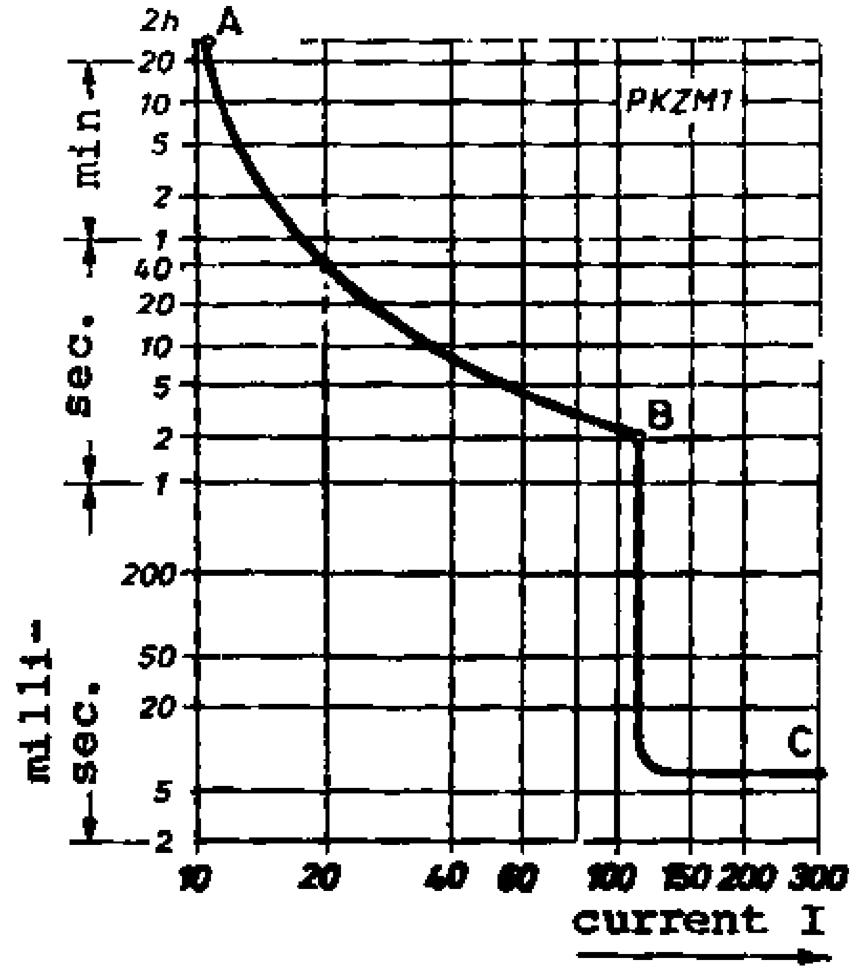
1. The switch contains bimetallic relays only.
2. The portion A to "B of the curve shows the characteristic of the magnetic fast relays.
3. The portion B to C of the curve shows the characteristic of the bimetallic relays.
4. AT a current of 150 A the switch operates within 7 ms.
5. It limits the short circuit current in case of 50 Hz alternating current.

G&D 9.2 A nominal current of 20 A is set at the motor protective switch whose characteristic is shown in the figure. After how much time does the switch operate in case of an overcurrent of 30 A?



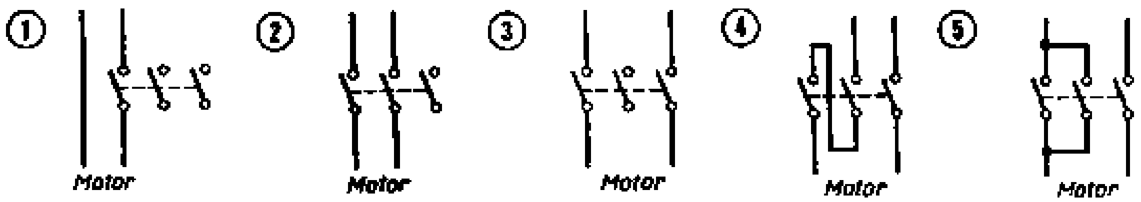
1. After about 2 seconds.
2. After about 5 seconds.
3. After about 20 seconds.
4. After about 40 seconds.
5. After about 2 minutes.

G&D 10.1 A nominal current of 25 A is set at the motor protective switch whose characteristic is shown in the figure. In which of the following cases does the switch operate?



1. When a switching current surge of 245 A flows for 5 ms.
2. When 250 A flow for 1 s.
3. When 150 A flow for 5 s.
4. When 50 A flow for 20 s.
5. When 25 A flow for 2 hours.

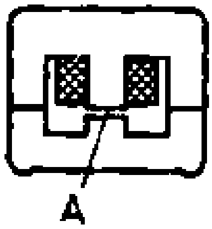
G&D 10.2 A three phase contactor is to be used for a 220 V D.C. motor. Which of the following circuits can be used for this purpose?



G&D 11.1 The operating voltage of a contactor which operates at 220 V, 50 Hz increases to 250 V due to an interturn short circuit of the control transformer. What is the effect of this?

1. The contactor is not attracted.
2. The contact force is insufficient.
3. The attracted contactor is dropped.
4. When switching on the armature and the contact start chattering.
5. The insulation of the coil is destroyed immediately.

G&D 11.2 The magnetic system of contactors has an air gap (marked A). What is the purpose of this air gap?

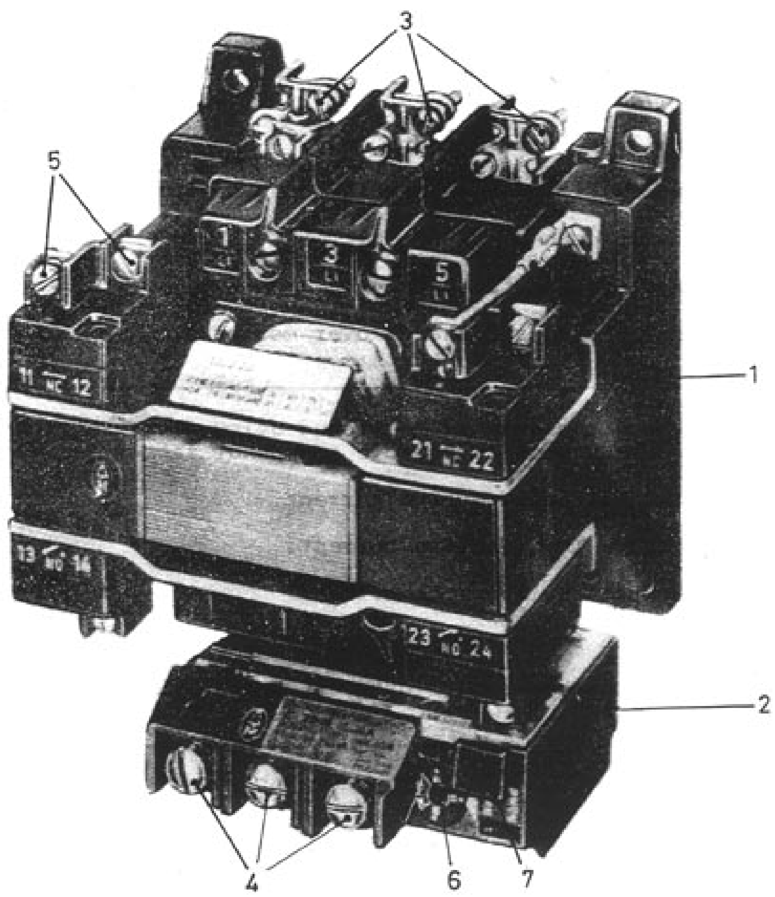


1. It prevents the inadmissible heating of the iron core.
2. It prevents the inadmissible heating of the coil.
3. It prevents the sticking of the contactor armature after switching off.
4. When switching on it prevents the chattering of the armature.
5. It prevents the dropping of the armature in case of low voltage.

G&D 11.3 Why is the magnetic system of alternating current operated contactors laminated?

1. To reduce the eddy current losses.
2. To reduce the hysteresis losses.
3. To increase the magnetic conductivity of the magnetic system.
4. To improve the cooling.
5. To simplify the construction and to decrease the cost.

G&D 12.1 With what types of contacts is the above contactor equipped?



1. Only 3 main contacts
2. 3 main contacts and 4 normally closed contacts
3. 6 main contacts and 4 normally open contacts
4. 6 main contacts, 2 normally open, 2 normally closed contacts
5. 3 main contacts, 2 normally open, 2 normally closed contacts

G&D 12.2 For which purpose is the combination of part 1 & 2 normally used?

1. As a main switch in control circuits
2. As a main switch in heating
3. As a motor protective switch
4. As a line protective switch
5. As an emergency switch

G&D 13.1 With what types of auxiliary contacts are contactors usually equipped?

1. Normally closed contacts only.
2. Normally closed and normally open contacts.
3. Normally open contacts only.
4. Change over contacts only.
5. Normally open and change over contacts.

G&D 13.2 For which of the reasons mentioned below does the electric supply company want to improve the power factor?

1. To reduce the effective current.
2. To reduce the reactive current.
3. To reduce the apparent current.
4. To reduce the voltage drop at the generating station.
5. To reduce the voltage drop on the lines.

G&D 13.3 What is the purpose of a compensating capacitor?

1. To start a fluorescent lamp.
2. To start a single phase motor.
3. To suppress radio noise from electric appliances.
4. To improve the power factor.
5. To increase the angle of phase difference.