

Basic Electrical 25 Important MCQ Question With Explanation

Question-1) Kirchhoff's current law is applicable to only

- (a) closed loops in a network
- (b) electronic circuits
- (c) junctions in a network
- (d) electric circuits.

Answer- a

Explanation- Kirchhoff Current Law states that the total current in a closed circuit, the entering current at node is equal to the current leaving at the node or the algebraic sum of current at node in an electronic circuit is equal to zero.

Question-2) Kirchhoff's voltage law is concerned with

- (a) IR drops
- (b) battery e.m.fs.
- (c) junction voltages
- (d) both (a) and (b)

Answer- d

Explanation- Kirchhoff's voltage law states that "the algebraic sum of products of currents and resistances in each of the conductors in any closed path in a network plus the algebraic sum of the e.m.fs in that path is zero".

In other words, $\sum IR + \sum e.m.f. = 0$

Question-3) The open circuit impedance of a certain length of a loss-less line is 100Ω . The short circuit impedance of the same line is also 100Ω . The characteristic impedance of the line is

- (a) $100\sqrt{2} \Omega$
- (b) 50Ω
- (c) $100/\sqrt{2} \Omega$

(d) $100\ \Omega$

Answer- $100\ \Omega$

Explanation- Characteristic impedance (Z_c) = $\sqrt{Z_{oc} \cdot Z_{sc}}$ where Z_{oc} is open circuit impedance and Z_{sc} is short circuit impedance. Thus $= \sqrt{100 \cdot 100} = 100$ ans.

Question-4) The rms value of the resultant current in a wire which carries a dc current of 10 A and a sinusoidal alternating current of peak value 20 A is

(a) 14.1 A

(b) 17.3 A

(c) 22.4 A

(d) 30.0 A

Answer- 17.3 A

Explanation- A.T.Q – Calculation of rms value = DC + sinusoidal peak value

So RMS value = $\sqrt{(\text{dc current})^2 + (\text{peak current} / \sqrt{2})^2} = 17.3$

Question-5) Maxwell's loop current method of solving electrical networks

(a) uses branch currents

(b) utilizes Kirchhoff's voltage law

(c) is confined to single-loop circuits

(d) is a network reduction method

Answer-b

Explanation- The Mesh Current Method is similar to the Branch Current method in that it uses simultaneous equations, Kirchhoff's Voltage Law, and Ohm's Law to determine unknown currents in a network.

Question-6) The algebraic sign of an IR drop is primarily dependent upon the

(a) amount of current flowing through it

(b) value of R

- (c) direction of current flow
- (d) battery connection.

Answer-c

Explanation-The algebraic sign of an IR drop is primarily dependent upon the direction of current flow.

Question-7)Two heaters, rated at 1000 W, 250 volts each,are connected in series across a 250 Volts 50 Hz A.C. mains. The total power drawn from the supply would be ——— watt.

- (a) 1000
- (b) 500.
- (c) 250
- (d) 2000

Answer- b

Explanation-Heater 1 – 1000 W ,500 V, So $P = V^2 / R = R1 = 250^2 / 1000 = 62.5$ ohm

Heater 2 – Same rating so $R2 = 62.5$

Calculate –total power from source = $V * I$

Total Resistance = $62.5 * 2 = 125$

Total current = $250 / 125 = 2$

So total power from source = $250 * 2 = 500$ W

Question-8) For a given line voltage, four heating coils will produce maximum heat when connected

- (a) all in parallel
- (b) all in series
- (c) with two parallel pairs in series
- (d) one pair in parallel with the other two in series

Answer- a

Explanation-Since in parallel circuit equivalent resistance will decrease so current will increase and heating effect is more .

Question-9) One kWh of energy equals nearly

- (a) 1000 W
- (b) 860 kcal
- (c) 4186 J
- (d) 735.5 W

Answer- b

Explanation-1 Kilowatt Hour = 860 kilo Calories.

Question-10)The unit of absolute permittivity of a medium is

- (a) joule/coulomb
- (b) newton-metre
- (c) farad/metere
- (d) farad/coulomb

Answer- c

Explanation-The SI unit for permittivity is farad per meter (F/m or $F \cdot m^{-1}$)

Question-11)The unit of electric intensity is

- (a) joule/coulomb
- (b) newton/coulomb
- (c) volt/metre
- (d) both (b) and (c)

Answer- d

Explanation-The SI unit of electric field strength is newtons per coulomb (N/C) or volts per meter (V/m).

Question-12) In practice, earth is chosen as a place of zero electric potential because it

- (a) is non-conducting
- (b) is easily available
- (c) keeps losing and gaining electric charge every day
- (d) has almost constant potential.

Answer- d

Explanation-In practice, earth is chosen as a place of zero electric potential because it has almost constant potential.

Question-13) A capacitor consists of two

- (a) insulation separated by a dielectric
- (b) conductors separated by an insulator
- (c) ceramic plates and one mica disc
- (d) silver-coated insulators

Answer- b

Explanation-A capacitor is a passive two-terminal electronic component that stores electrical energy in an electric field. The effect of a capacitor is known as capacitance. It consists of two conductors separated by an insulator.

Question-14) The capacitance of a capacitor is NOT influenced by

- (a) plate thickness
- (b) plate area
- (c) plate separation
- (d) nature of the dielectric

Answer - A

Explanation-The capacitance of a capacitor is influenced by-plate area, plate separation, nature of the dielectric

Question-15) How many 200 W/200 V incandescent lamps connected in series would consume the same total power as a single 100 W /200 V incandescent lamp ?

- a) 1
- b) 2
- c) 3
- d) 4

Answer-b

Explanation- 200 W/200 V incandescent lamp ,power = $P = V^2 / R$

$$R = 200^2 / 200 = 200$$

$$\text{For 100 W/200 V lamp , } R = V^2 / P = 200^2 / 100 = 400$$

So the use of 2 Nos of 200 W/200 V incandescent lamps connected in series to consume the same total power as a single 100 W /200 V incandescent lamp

Question-16) The inductance of a long solenoid of length 1000 mm wound uniformly with 3000 turns on a cylindrical paper tube of 60 mm diameter is

- (a) 3.2 μH
- (b) 3.2 mH
- (c) 32.0 mH
- (d) 3.2 H

Answer- c

Explanation- Inductor of solenoid is given as $L = \mu_0 N^2 A / l$.

Question-17) Permanent magnets are normally made of

- (a) aluminium
- (b) wrought iron
- (c) cast iron
- (d) alnico alloys

Answer- d

Explanation-Alnico alloys are used as permanent magnets, as they are ferromagnetic.

Question-18) A coil of 1000 turns is wound on a core. A current of 1 A flowing through the coil creates a core flux of 1 mWb. The energy stored in the magnetic field is

- (a) 0.25 J
- (b) 0.5 J
- (c) 1 J
- (d) 2 J

Answer- b

Explanation-Energy stored = $\frac{1}{2} L I^2$

$$\begin{aligned}\text{Energy stored} &= \frac{1}{2} * 1000 * 0.001 * 1^2 \\ &= 0.5 \text{ J}\end{aligned}$$

Question-19) Two sinusoidal currents are given by the equations : $i_1 = 10 \sin (\omega t + \pi/3)$ and $i_2 = 15 \sin (\omega t - \pi/4)$. The phase difference between them is — degrees.

- (a) 105
- (b) 75
- (c) 15
- (d) 60

Answer – a

Explanation-Simple draw the phasor you will get the difference between phasor as 105 degree

Question-20) The r.m.s. value of a half-wave rectified current is 10 A, its value for full-wave rectification would be — amperes.

- (a) 20
- (b) 14.14
- (c) 20/

(d) $40/\pi$

Answer- b

Explanation-RMS value of HWR = $V_m/2$

RMS value of FWR = $V_m/\sqrt{2}$

Using these formula, we get $V_m=20$

And hence rms of FWR = $10\sqrt{2} = 14.14$

Question-21) In a series RLC circuit at resonance, the magnitude of the voltage developed across the capacitor

(a) is always zero

(b) can never be greater than the input voltage.

(c) can be greater than the input voltage, however, it is 90 degree out of phase with the input voltage

(d) can be greater than the input voltage, and in phase with the input voltage.

Answer- c

Explanation- In a series RLC circuit at resonance, the magnitude of the voltage developed across the capacitor can be greater than the input voltage, however, it is 90 degree out of phase with the input voltage

Question-22) The p.f. of an R-C circuit is

(a) often zero

(b) between zero and 1

(c) always unity

(d) between zero and -1

Answer-b

Explanation- The p.f. of an R-C circuit is between zero and 1.

Question-23) Total instantaneous power supplied by a 3-phase ac supply to a balanced R-L load is

- (a) zero
- (b) constant
- (c) pulsating with zero average
- (d) pulsating with non-zero average

Answer- b

Explanation- Total instantaneous power supplied by a 3-phase ac supply to a balanced R-L load is constant.

Question-24) A balanced 3-phase, 3-wire supply feeds balanced star connected resistors. If one of the resistors is disconnected, then the percentage reduction in the load will be

- (a) $33 \frac{1}{3}$
- (b) 50
- (c) $66 \frac{2}{3}$
- (d) 75

Answer- b

Explanation- If one resistor is removed from a 3- Φ , circuit, then the circuit is no longer 3-phase but converted into single phase circuit, having two resistor, each of R ohms connected in series across the supply of V_L volts. Hence the total power consumed = $V_L^2 / 2R$ Reduction in load

$$(V_L^2 / R - V_L^2 / 2R) / V_L^2 / R * 100 = 50$$

Question-24) The r.m.s. value of the complex voltage given by $v = 16 + 2 \sin \omega t + 122 \sin 3\omega t$ is

- (a) 87.94
- (b) 20
- (c) 282
- (d) 192

Answer- a

Explanation-Calculation of rms value = DC+ sinusoidal peak value

$$\text{So RMS value} = \sqrt{(\text{dc current})^2 + (\text{peak current} / \sqrt{2})^2} = \sqrt{16^2 + (2/\sqrt{2})^2 + (122/\sqrt{2})^2} = 87.74$$