(Mark-1)

Q. —CA— Transformer maximum → _____.

Q-1. What will happen if the field connection of a DC shunt motor becomes disconnection while under running load condition?

Ans: The motor will attain dangerously high speed.

Q-2 Shell type Transformer is popularly used because it has less leakage flux. [T/F] → [True]. (Max efficiency → shell type)

Q-3. In a transformer low voltage windings are placed ~~to~~ near to the core in the case of concentric windings because it reduces leakage loss. (leakage less).

Q-4 The humming coils in a transformer is due to vibration of ~~st~~ the core ~~st~~ set-up by magnetic forces.

Q-5 During no-load test, an induction motor draws power due to _____ and _____ losses.

Q-6 Three phase Induction motor have _____ high efficiency than Single phase induction motor of same type.

Q-7 415 V, 4 Pole, 50 Hz, 3-ϕ Induction motor runs with a speed of 1490 rpm. Calculate the slip percentage of that mtr.

$$\frac{N_s - N_r}{N_s} \times 100\%$$

$V = 415\ V$.
$P = 4$ Pole.
$f = 50$ Hz.

$$3 \Rightarrow N_s = \frac{120 f}{P} = \frac{120 \times 50}{4} = 1500 \text{ rpm.}$$

Slip percentage $= \frac{N_s - N_r}{N_s} =$

$$= \frac{1500 - 1490}{1500} \times 100\%$$

$$= \frac{10 \times 2}{3 \cancel{1500}} \times 100\%$$

$$= \frac{2}{3}\%$$

$$= 0.66\%$$

(*) Q. For a 3-ϕ induction motor, if we increase the mechanical load of the motor, then slip decrease [False].
(increase)

Q. A transformer is having 900 turns for l.v. winding which is connected to a 230 V supply. The secondary no-load voltage is 960 Volts. Calculate the terms on the high voltage side.

$$\Rightarrow \frac{V_2}{V_1} = \frac{N_2}{N_1}$$

$$\Rightarrow \frac{460}{230} = \frac{N_2}{900}$$

$$\Rightarrow N_2 = 1800. \text{ (Ans)}.$$

Q. Power factor of a Pure inductor in an ac circuit is ~~Power factor lagg.~~ 0

Q. The Power factor of series R-L-C Circuit at resonance is 1 / unity.

Q. Active Power Consume by a Pure capacitive circuit is 0.

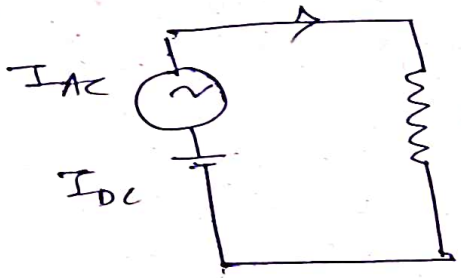
$(VI\cos 90^\circ) = 0.$

~~VI cos 0~~

Q. Give one importance of creast factor or amplitude factor of a sinusoidal wave factor.

Q. If the current waveform contains AC and DC, The find the expression for its r.m.s. Irms.

Ans:



$$I_{rms} = \sqrt{(I_{dc})^2 + \left(\frac{I_{ac}}{\sqrt{2}}\right)^2}$$

Q. Power is dissipated regardless of the direction in which current flows through a capacitor. [T/F] (True).

I → (+ve)/(-ve) → (Still positive)

Q. If the current and voltage expressions of an element are $I(t) = I_m \sin(314)t$.

$V(t) = V_m \sin(314)t$.

Then find what type of element is it. angle difference between V & I is 0.

~~$I_E = Z_m \sin\omega t$~~

(Resistive element)

Q. In series Resonant ckt, higher Q factor means higher Q means _____.

$$f = \frac{1}{2\pi\sqrt{LC}}$$

$$Q = \frac{1}{R}\sqrt{\frac{L}{C}}$$

Q. How does the power factor of an pure inductive ckt get affected if we add a resistance in series to it.

$$P.f = \frac{R}{Z}$$

$$Z = \sqrt{R^2 + X_L^2}$$

~~$VI\cos\theta$~~

~~$VI\cos 0$~~

$\Rightarrow$ ~~$VI(1)$~~

Pure capacitor

0 lead

P = improving or become poor.

Ans

Q: If a parallel ckt, consisted of 2 resistance, same voltage acts across them,

Q. Conductance means how leakage current can flow through a conductor.

Q. If the diameter of a conductor is doubled, then the resistance of the conductor will be ________ of its ori

$R \propto l$

$\frac{R_1}{R_2} = \frac{l_1/A_1}{l_2/A_2}$

$\frac{R_1}{R_2} = \rho \cdot \frac{l_1}{d_1^2}$

$d_2 = 2d_1$

$l_2 = l/2$

$R_2 = \rho \cdot \frac{\frac{l}{2}}{4d_1^2}$

$= \rho \cdot l/2 \times \frac{1}{4d^2}$

$= \frac{1}{8} \rho \frac{l_1}{d^2}$

$= \frac{1}{8}$

Q. What are the two elements of the Norton Equivalent ckt.

→ Norton current,
" Res.

Q. The Thevenin's equivalent ckt, of any complex linear ckt, consists of Thevenins voltage and Thevenin resistance

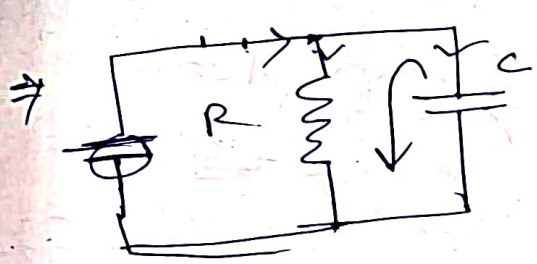
Q: Mesh analysis is based on KVL law. (Conservation of energy)

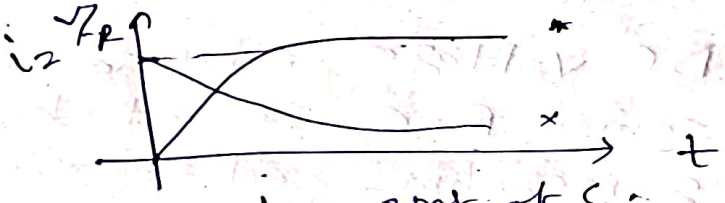
Q: Kirchoff's current law is based on the law of conservation of charge.

Q: What is the Combined Capacitance of three capacitors of capacitances of 12 μF, 4 μF, and 6 μF respectively connected in series

C = $\left(\frac{1}{12} + \frac{1}{4} + \frac{1}{6}\right)$ μF.

Q: A capacitor of 12 μF is connected in series with a 0.5 mega-ohms resistor. Find the time constant of the ckt.





* charging of C.
x discharging graph

for (R-C) $\tau = RC$ sec.

for (R-L) $\tau = \frac{L}{R}$ sec.

Q: An inverter is a DC to AC converter.

Q: _____ type of inverter is commonly used for low power consuming ckt.

Q: Compairing the efficiency of half bridge and full bridge inverters full

bridge inverter is more ~

Q. In ... SPWM (Single pulse width modulation) technique the reference single is _____ wave.

Q. In a 3-ϕ inverter, the output of different phases have a phase difference 120° degrees.

~~Q.~~

5 no marks

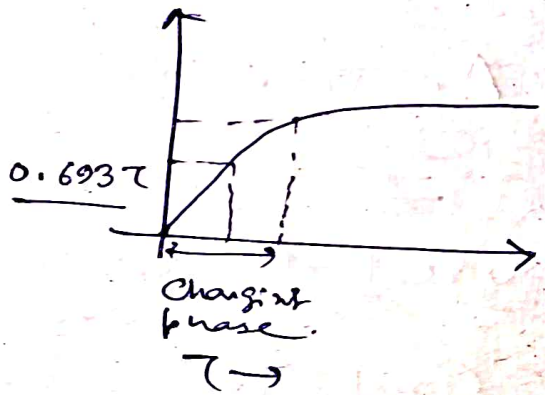
1) Name a material that has negative co-efficient of resistance and ~~its~~ is very commonly used in electrical engineering. (Carbon, graphite)

+ KVL → Math (1+4) = 5.

2) A DC voltage source is connected across a series R-C circuit having a resistance of 2 megohms and a capacitor of ~~50~~ 15 MF. Find the time taken for the capacitor to retain a charge that is 50% of its final steady state value, when the voltage source is short circuited.

⇒ $\tau = RC$ sec.

→ $T = 0.693\tau$.
(for 50%)
[half life time].

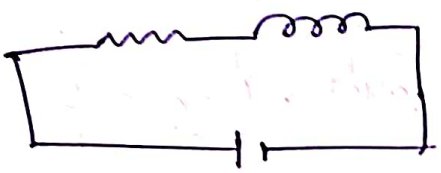


3) Two bulbs each rated 100W, 230V are connected in series across 230V DC Mains. Calculate the Power dissipated by each bulb.

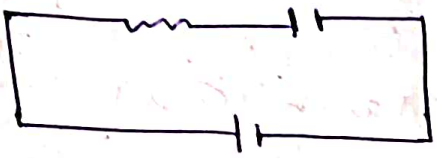
⇒

4) To separate R-L and R-C series ckts are ~~set~~ switched on to two separate DC sources of strength E volts. Then calculate the initial currents in this two ckts.

⇒ R-L

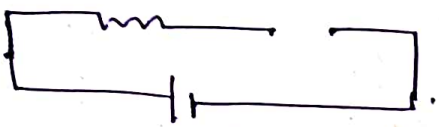


R-C



Initial phase → before switch on
transient phase → just switched on
Steady phase → After switch on.

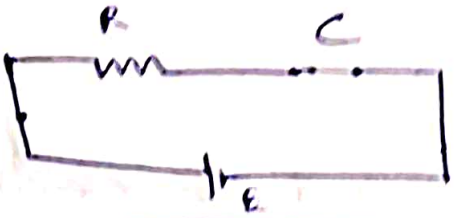
During Initial and steady phase, An Inductor ~~work~~ behaves like open ckt.



$I = 0.$

Inductor opposes the sudden change in the flow of current. After pressing the switch, the change in ckt is blocked by inductor, so it becames open circuited. And same in steady state. So, $\boxed{I = 0.}$.

In initial and steady state, Capacitor become short circuited. After on the switch, the current will be with a maximum.



$I = E/R$

---

5) A regi. resistance of 1 KΩ and an inductance of 150 milli H. are connected in series with a battery of 100 Volts. The switch is closed at T=0. Determine →

i) Time Constant of the ckt. ($\tau = \frac{L}{R}$).

ii) Steady state value of current.

iii) Value of current at $t = 2T$. (Steady state)

iv) Voltage drop across resistance at $t = 0+$. (After

---

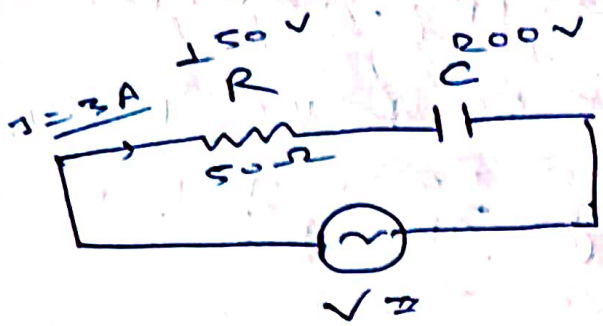
6) ⓐ Thevenin Theorem (Meth).

---

7) ⓐ A capacitor and a 50 Ω resister are connected in series to an alternating current supply. The voltage across the capacitor is 200 Volts and across the resister is 150 Volts. (r.m.s. values) Determine the →

i) R.m.s. value of Supply voltage.

ii) Power consumed by the resistor.



$$V = \sqrt{V_R^2 + V_C^2}$$

$$= \sqrt{150^2 + 200^2}$$

$$= .$$

$$P = I^2 . R$$
$$= (3^2)(50)$$
$$= 9 \times 50$$
$$= 450 \text{ W.} \quad \text{(Ans)}$$

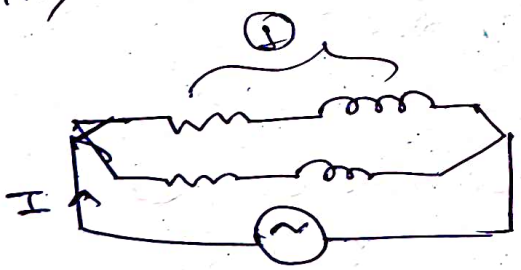
8) A coil of resistance 10 Ω an inductance 0.02 H, is connected in series with another coil of resistance 6 Ω and 15 milli H across a 230 V, 50 Hz supply. Calculate →

i) Impedence of the ckt.

ii) voltage drop across each coil.

iii) Total Power. (Active, Reactive, Apparent).

⇒



9) A 100 V, 80 W Lamp is to be operated on a 240 V, 50 Hz AC supply. Calculate →

i) Non-inductive resistance of the Lamp.

ii) Pure-Inductor to be connected in the ckt for satisfactory operation.

⇒

---

10) A 200 KVA, single phase transformer has 1000 turns in the primary and 600 turns in the secondary. The primary winding is supplied from a 440 V, 50 Hz source. Calculate →

i) Voltage on the secondary side.

ii) Current in the primary and secondary coil.

iii)

---

11) Deduce the EMF eqn, of a 1-ϕ transformer

How these two EMFs are related to turns Ratio of the transformer. (Notation mention)

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12) A 3-ϕ induction motor draws a Line current of 10 Amp. when connected to a 415 V. If the power factor of the motor is 0.8 lagging then calculate →

i) Total Apparent Power of the motor.

13) A 5KVA, 400/200 V, 50 Hz, 1-Φ transformer gives the following results with instruments connected ⟶ LV.

OC → 400V, 2A, 120W.

SC → 25A, 30V, 500W.

Calculate the OC & SC parameters.

14) A 3-Φ, 6 Pole 50 Hz induction motor has a slip of 1% at no load and 3% at full load. Calculate synchronus speed, no load speed, full load speed.

15) A 3-Φ induction motor runs at 1470 rpm At full load with 50 Hz supply. Find the no. of Poles of the motor and full load slip.

---

16) i) What are the factors based on which we can control the speed of a DC motor.

ii) Explain the flux control method of varying the speed of a DC shunt motor.

---

17) Describe the strategy with the help of a neat diagram that should be taken to run a DC shunt motor below its rated speed.

ii) What are the disavantages of the method.

18) i) What is the necessity of a starter of a DC motor.

ii) What type of starter do you prefer to start a DC shunt motor. Give proper justification.

19) What are the functions of no-volt coil and over load release coil in a star-delta starter? Which type of starter do you prefer for a 10 Hp squirrel cage inductor motor?

20) Give one application for each of the following machines —

(a) Slip ring inductor motor.

(b) Squirrel cage inductor motor.

(c) DC shunt motor.

(d) DC series generator.

(e) Differential compound DC generator.

1) Identify which of the following motor are self starting motor? —

(a) Synchronous motor.

(b) Slip ring induction motor.

(c) Capacitor start and Capacitor run 1-ϕ inductor motor.

(d)

2) For what purpose we use following Converters →

(a) Uncontrolled rectifiers.
(b) Controlled rectifiers.
(c) DC-DC Converters.
(d) Inverters.
(e) AC-AC voltage regulators.

3) A step up DC Converter supplies a load of 480 V. from a 230 V DC supply. Assuming the non-conduction period of the switch to be 50 microsecond, find the on-time of the step up converters.

(T = 50)

4) Why do we use ELCB ?

(Earth Leakage Circuit Breaker)

How many types of ELCB are available in the market.

5) What are the advantages of using MCB over fuse ?

6) What are the three main functions of MCCB. Give two applications of MCCB.

7) How do we specify the capacity of a battery ? Define specific energy and specific density of a battery.

Short

Q. _____ Type of inverter is commonly used for high Power consuming Ckt.

Q. If the duty cycle is Low, for a buck-boost regulator then ~~the~~ output voltage is _____ than input voltage.

Q. In an induction oven first 50 Hz AC is converted to DC by rectifier, then _____ converts DC to high frequency AC which is ~~fed~~ fed to the inductor coil.

Q. The output voltage of an inverter can be controlled either from _____.

Q. The main purpose of performing open ckt test on a transformer is to measure its Core loss.

Q. In an induction motor, there is no electrical connection to the _____.

Q. The Action of a ~~fuse~~ fuse is based upon the _____ effect of electric current.

Q. Fuse reacts to a fault faster than MCB because of to its low current cut-off value. [T/F]. (False)

Q. Earthing provides a path for a fault current to flow to the earth.

Q. Active power reduces productive power where as Reactive power produces no productive power.

Q. _____ is used to measure the specific gravity of a electrolite to test the state of charge of a battery cell.

Q. The capacity of a battery is expressed in terms of Ah. ratings.

Q. To prevent local action in a battery only _____ is used in electrolyte

Q. When load Power factor decreases then transmission loss _____.

ELCB is connected directly to an _____ cable so it can detect earth leakage currents.