

MODEL ANSWER PAPER

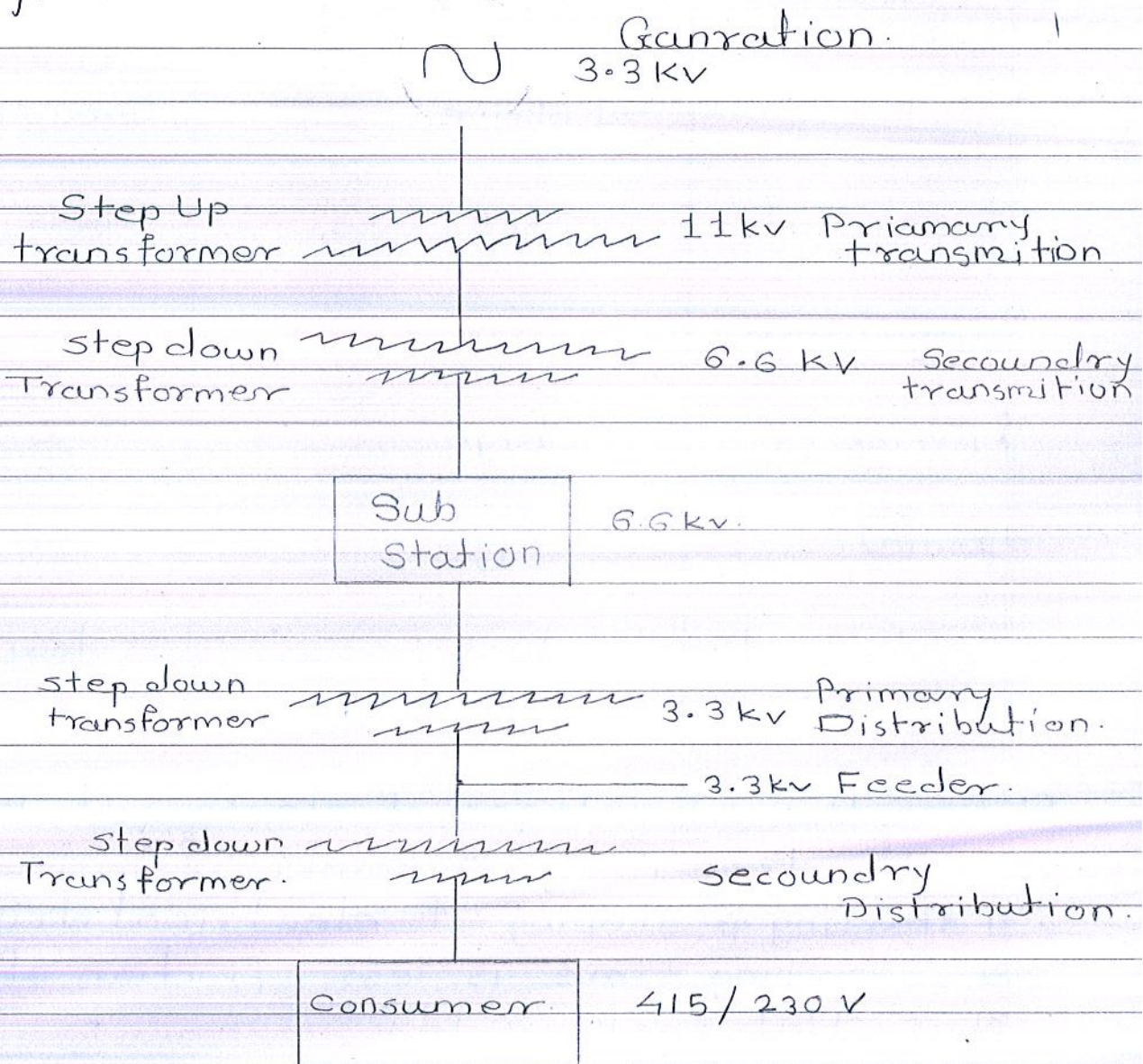
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Que 1

A) Draw a single line diagram of electrical supply & give different stage of it.

A single line diagram of electric supply Sys.



Generation

Transmission

Distribution

Utilization

B) Give the comparison betⁿ Individual drive & Group drive (Any 6 point)

Parameter	Individual drive	Group drive.
1) Def ⁿ .	A single operation performed by single drive is known as Individual drive.	If No. of operation performed by single drive is called as Group drive.
2) Economical	more	less.
3) Maintenance	Easy	low.
4) Efficiency	high	low.
5) Initial cost	high	low.
6) Operating cost	high	low.

C) Give the advantages of electrical drive over other drive (Any 6 point)

- 1) starting & stoping of electrical drive easy.
- 2) starting time is less (fraction of sec.)
- 3) Initial cost is low.
- 4) maintenance cost is low.
- 5) electrical drive are pollution free.
- 6) Remot control can be used.

Q) What are the different types are 3-Phase system?

→ Three type of power.

① Active power:-

It is the actual power consumed by the system.

$$P = \sqrt{3} V_L I_L \cos \phi \text{ (watt)}$$

$$\text{or } P = 3 V_{ph} I_{ph} \cos \phi \text{ (watt)}$$

② Reactive power:-

It is the power which is neither used by the system nor lost by the system. But it is present in the system.

$$Q = \sqrt{3} V_L I_L \sin \phi \text{ (Var)}$$

$$\text{or } Q = 3 V_{ph} I_{ph} \sin \phi \text{ (Var)}$$

③ Apparence power:-

It is the total power supplied to the system.

$$S = \sqrt{3} V_L I_L \text{ (VA)}$$

$$\text{or } S = 3 V_{ph} I_{ph} \text{ (VA)}$$

1e2

A) Define

a) Time period -: Time required to complete one cycle is known as time period.

Unit - sec.

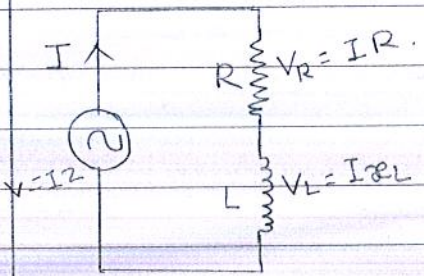
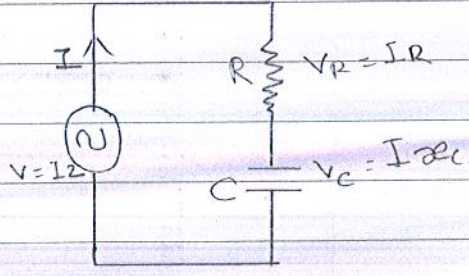
b) Frequency -: If number of cycle is completed in one sec. is known as frequency.

Unit - Hertz.

c) RMS value -: RMS value of an A.C. is equal to value of D.C. required to produce same amount of heat which is produced by an A.C.

d) Average value -: It is the average of all instantaneous value of Half cycle.

b) Comparison betⁿ R.L series & R.C. series circuit with following basis

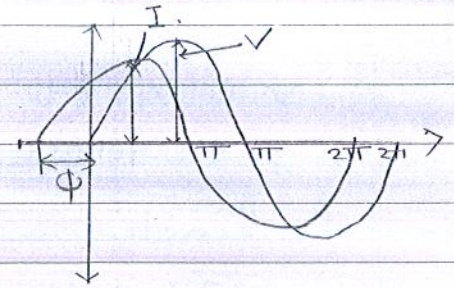
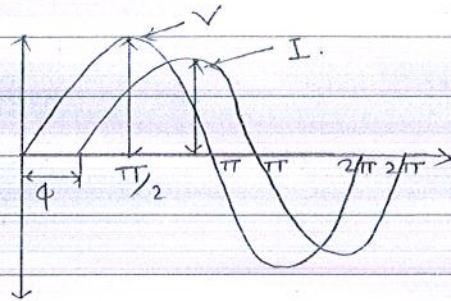
Parameter.	R.L series	R.C. series.
1] Diagram		
2] Voltage & current eq ⁿ .	$V = V_m \sin \omega t$ $I = I_m \sin \omega t - \phi$	$V = V_m \sin \omega t$ $I = I_m \sin \omega t + \phi$

Parameter:

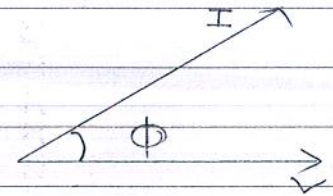
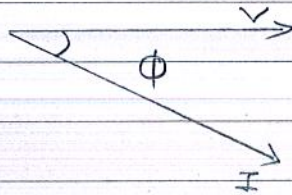
R.L series

R.C. series

③ voltage & current waveform.



④ Phasor diagram.



⑤ concept of power.

P_{av} = Power conserved by R + Avg L.

P_{av} = Power conserved by R + Avg C.

⑥ Concept of energy

total energy store by zero
 $E = \frac{1}{2} LI^2$

Avg. energy is zero
 $e.g^n: E = \frac{1}{2} CV^2$

- c] A resistance of 50 ohm & inductance of 0.30 H are connected in series across an A.C. v.tg. of 415V, 50Hz then find out
- Inductive reactance.
 - impedance.
 - Power factor.
 - active & Reactive power.

→ Given

$$R = 50 \Omega$$

$$L = 0.30 \text{ H}$$

$$V = 415 \text{ V}$$

$$f = 50 \text{ Hz}$$

∴ Find

$$X_L = ?$$

$$Z = ?$$

$$\cos \phi = ?$$

$$P = ?$$

$$Q = ?$$

Solⁿ

$$X_L = 2\pi fL$$

$$= 2 \times \pi \times 50 \times 0.30$$

$$\therefore X_L = 94.247 \Omega$$

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

$$= \sqrt{50^2 + 94.247^2}$$

$$\therefore Z = 106.688 \Omega$$

$$\cos \phi = \frac{R}{Z}$$

$$= \frac{50}{106.688}$$

$$\cos \phi = 0.4686$$

$$\therefore \phi = \cos^{-1} \left(\frac{R}{Z} \right)$$

$$= \cos^{-1}(0.4686)$$

$$\phi = 62.05^\circ$$

$$I = \frac{V}{Z}$$

$$= \frac{415}{106.688}$$

$$I = 3.389 \text{ A}$$

$$P = VI \cos \phi$$

$$= 415 \times 3.389 \times \cos(62.05)$$

$$= 659.19 \text{ W}$$

$$Q = VI \sin \phi$$

$$= 415 \times 3.389 \times \sin(62.05)$$

$$Q = 1242.38 \text{ Var}$$

Que 3

A) Give the comparison betⁿ star & delta circuit

Parameter	star circuit	Delta circuit
① Def ⁿ .	one terminal of each load is connected in common & other terminal is connected to 3 phase supply.	one terminal of load is connected to the other terminal of another load from closed bar & common terminal connected to the 3 phase supply.
Diagram.		
Rel ⁿ bet ⁿ line current & phase current	$I_L = I_{ph}$	$I_L = \sqrt{3} I_{ph}$
Rel ⁿ bet ⁿ line & phase v ^t g.	$V_L = \sqrt{3} V_{ph}$	$V_L = V_{ph}$
Name of wiring	3φ 4 wire sys.	3φ 3 wire sys.

B] Explain electrical heating with neat diagram?

→ It is a conversion of electrical energy into heat energy.

* Type of electrical heating.

1] Resistance heating →

a) Direct resistance heating.

b) Indirect resistance heating.

2] Induction heating →

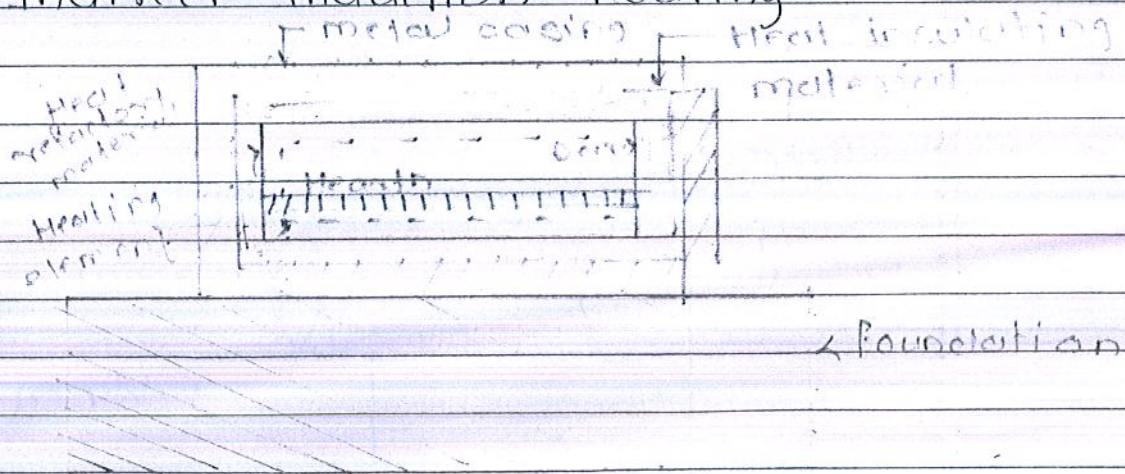
a) Direct induction heating.

b) Indirect induction heating.

3] Dielectric heating

4] Electric arc heating

Indirect induction heating -



When current is passed through the heating element in which resistance opposes the flow of current through it a heat energy is produced.

By joule's law,

$$H = I^2 R t$$

where,

I = current through the element in (A)

R = Resistance of element in (Ω)

t = Time for which current is passed through the element (sec)

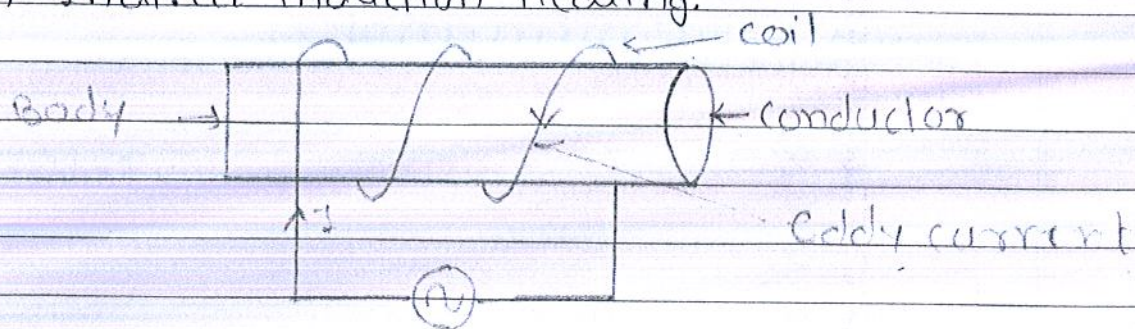
c) Explain's induction heating with neat diagram?
 Principle of electromagnetic induction heating.

Eddy current are produced because of changing magnetic field this eddy current is transformed directly through the boiler high resistance coil.

In this method hysteresis is present due to which energy is produced in the form of hysteresis loss in this heat energy is also used for heating purpose.

Types of induction Heating

- 1) Direct induction Heating.
- 2) Indirect induction Heating.



Induction heating -

By joule's law heat energy produced is

$$H = I^2 R t$$

where,

I = Current through the element in Amp

R = Resistance of element in ohm Ω

t = Time for which current is passed through the element.