**UNIT III**

**ELECTRICAL MEASUREMENTS**

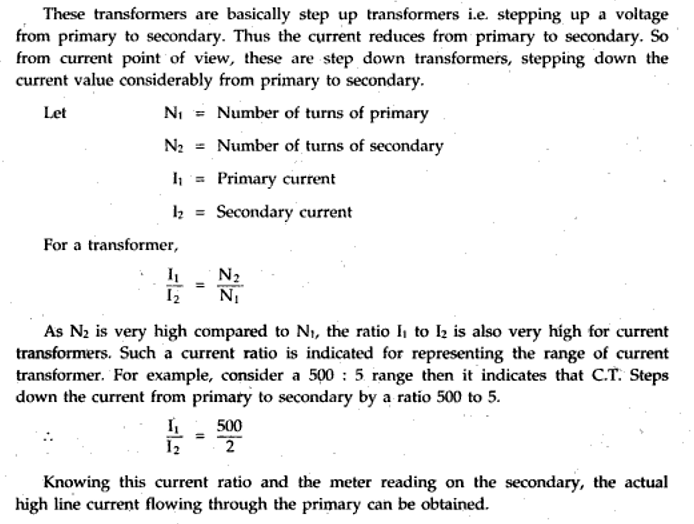
**3.1.Definition of Instrument Transformer**

[Instrument transformers](https://www.electrical4u.com/instrument-transformers/) means **current transformer** and [voltage transformer](https://www.electrical4u.com/voltage-transformer-or-potential-transformer-theory/) are used in [electrical power](https://www.electrical4u.com/electric-power-single-and-three-phase/) system for stepping down currents and voltages of the system for metering and protection purpose. Actually [relays](https://www.electrical4u.com/types-of-electrical-protection-relays-or-protective-relays/) and meters used for protection and metering, are not designed for high currents and voltages.  
High currents or voltages of [electrical power system](https://www.electrical4u.com/electric-power-single-and-three-phase/) can not be directly fed to relays and meters. CT steps down rated system [current](https://www.electrical4u.com/electric-current-and-theory-of-electricity/) to 1 Amp or 5 Amp similarly [voltage transformer steps down system](https://www.electrical4u.com/step-down-transformers/) voltages to 110 V. The relays and meters are generally designed for 1 Amp, 5 Amp and 110 V.

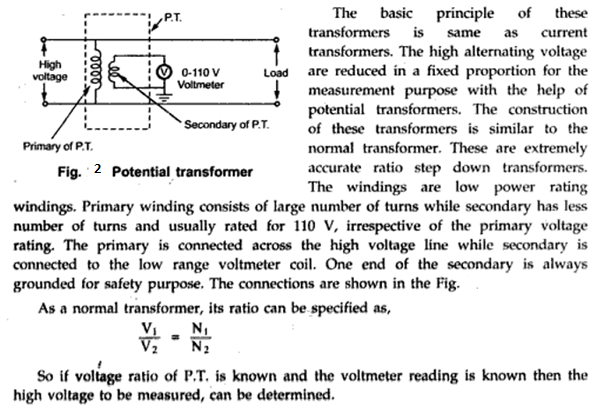
**3.2.Current Transformer**



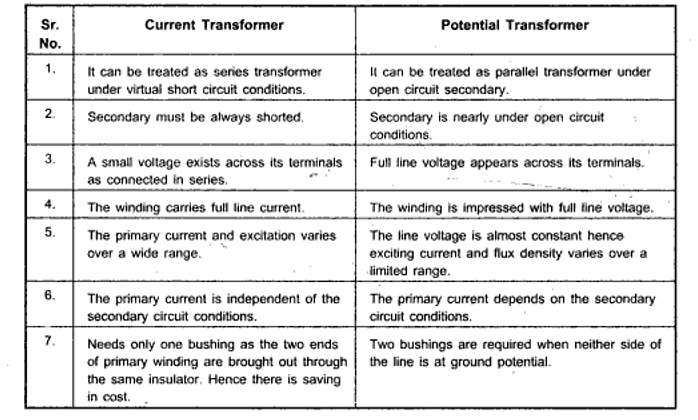
**3.2.1Working Principle**



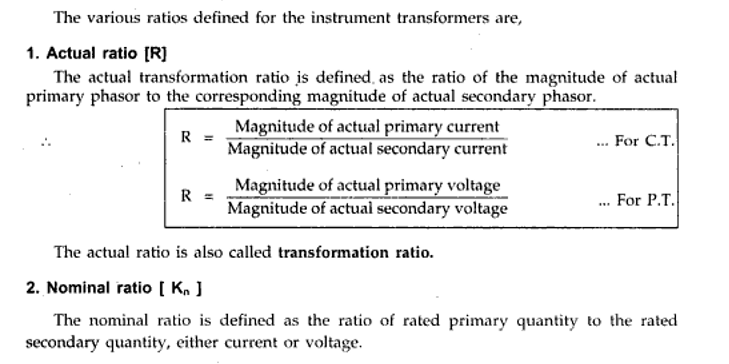
**3.3Potential Transformer:**

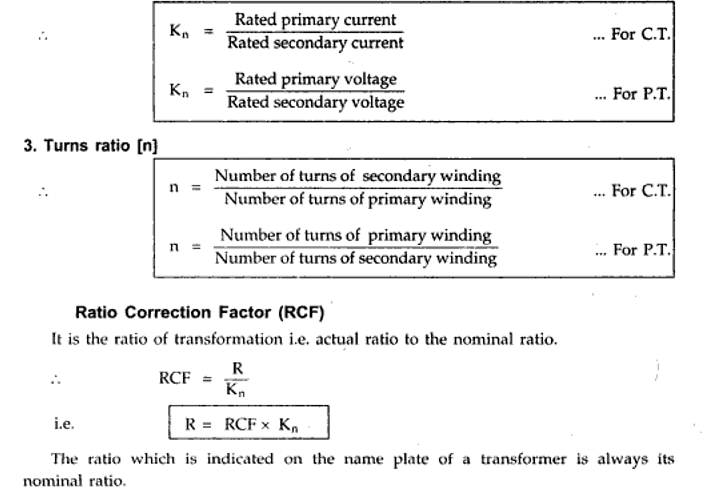


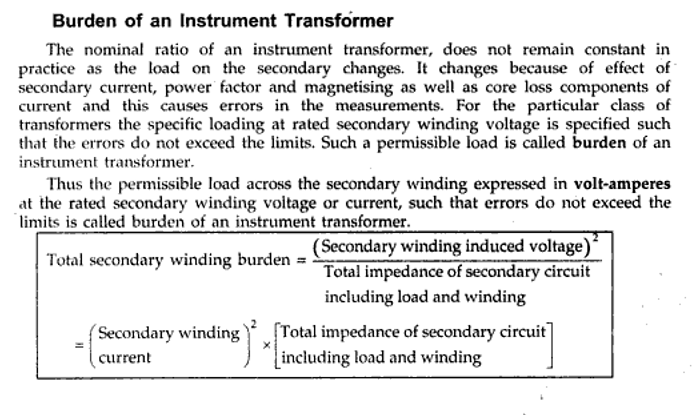
**3.4.Comparision of C.T and P.T:**

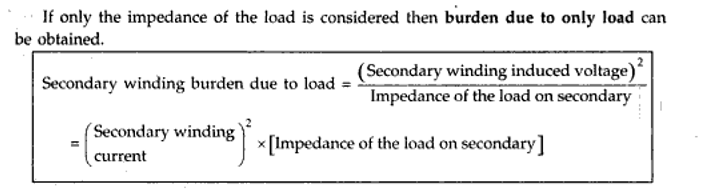


**3.5.Ratios of Instrument Transformers:**

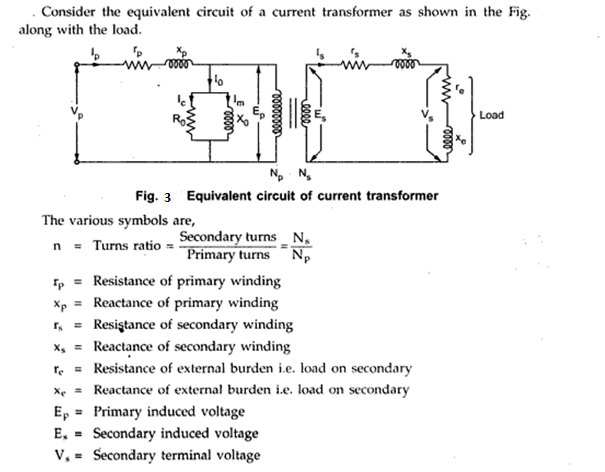


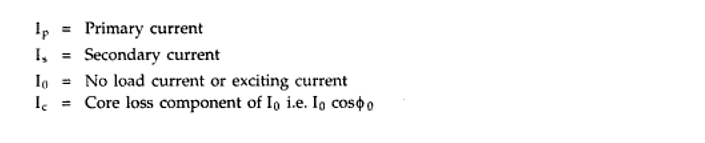


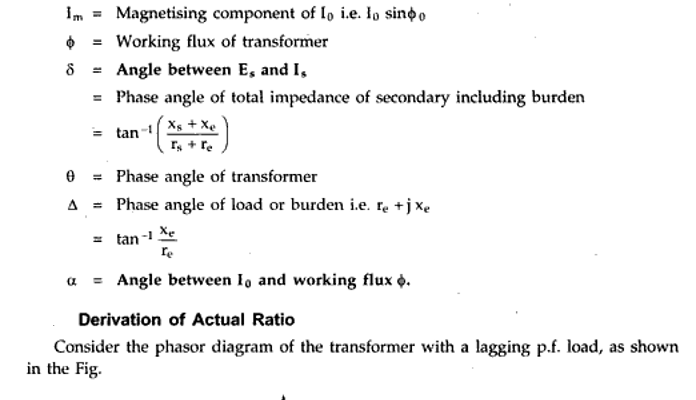
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**3.6.Theory of Current Transformer:**







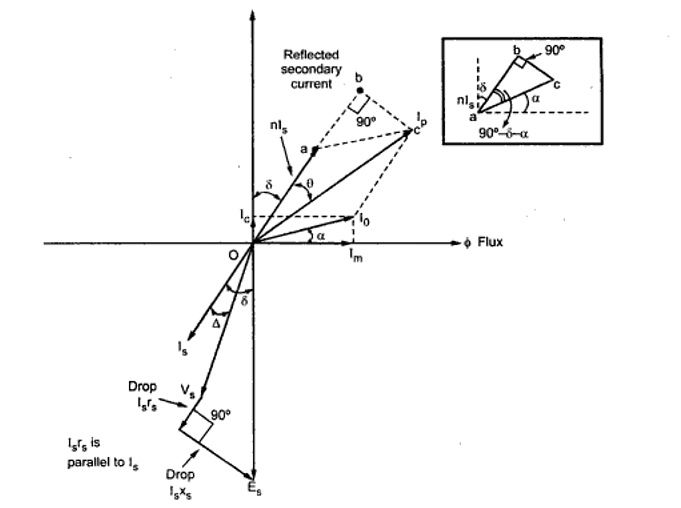
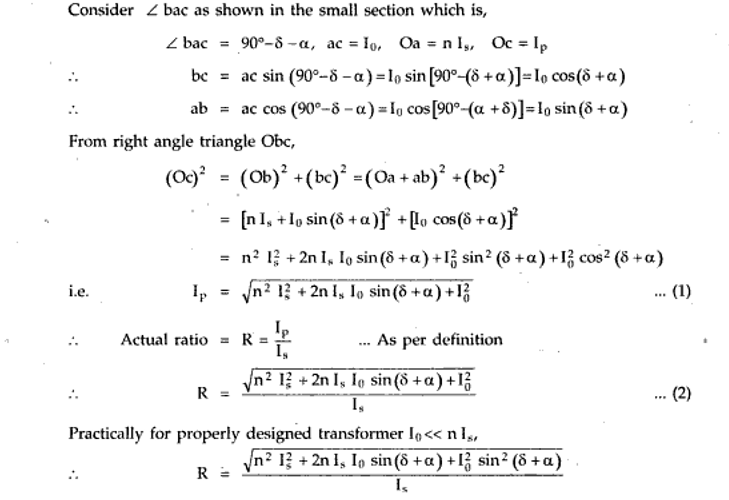
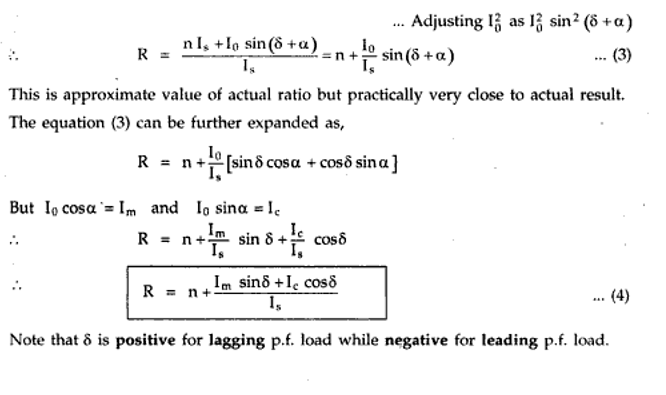
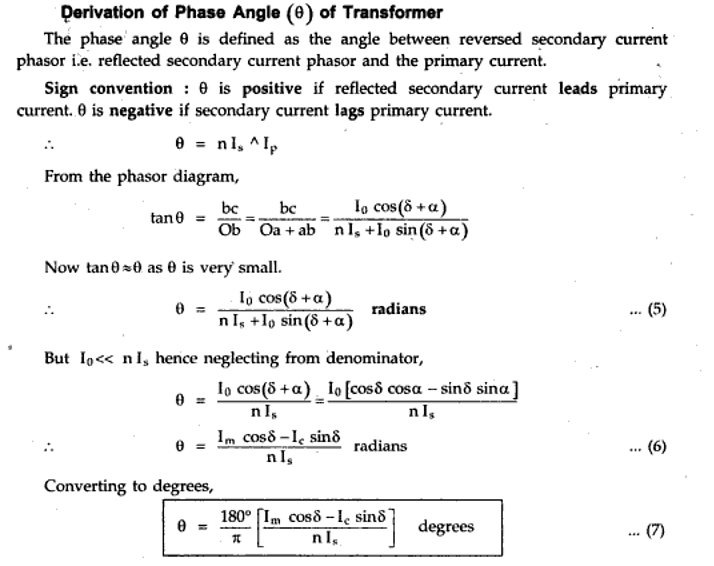
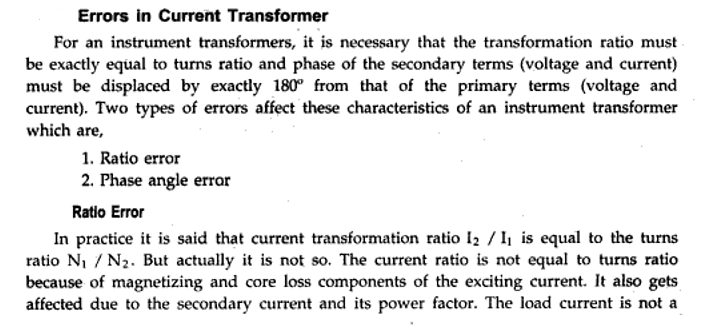


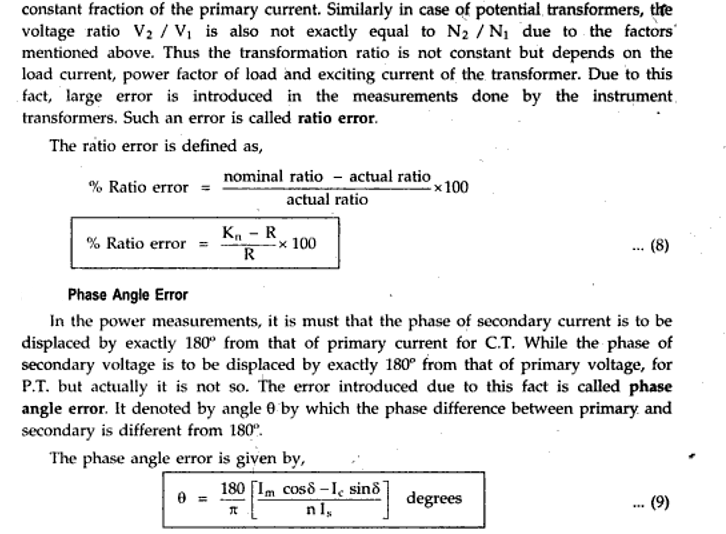
Fig.4. Phasor diagram of current transformer



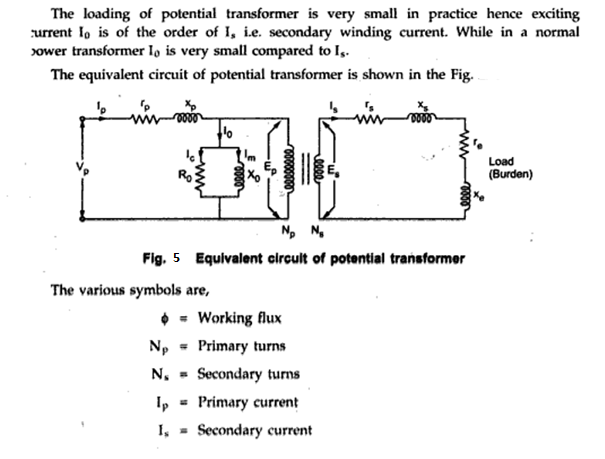


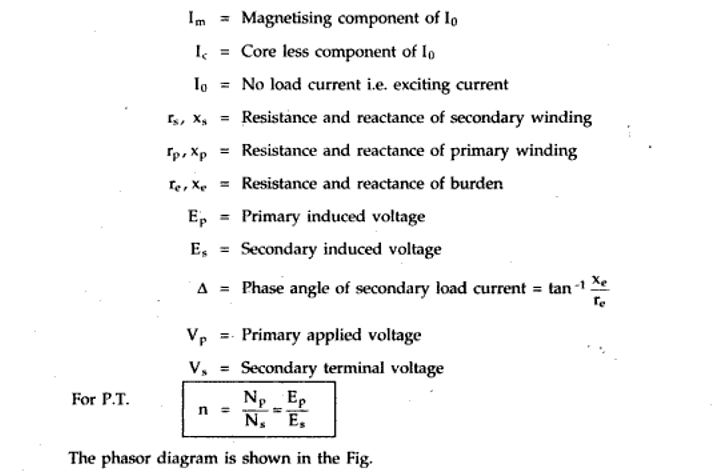


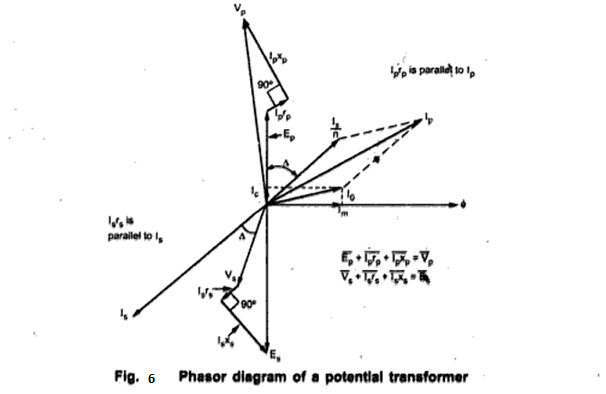


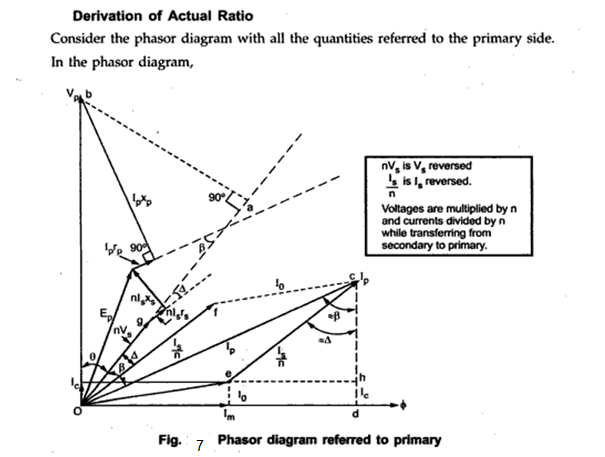


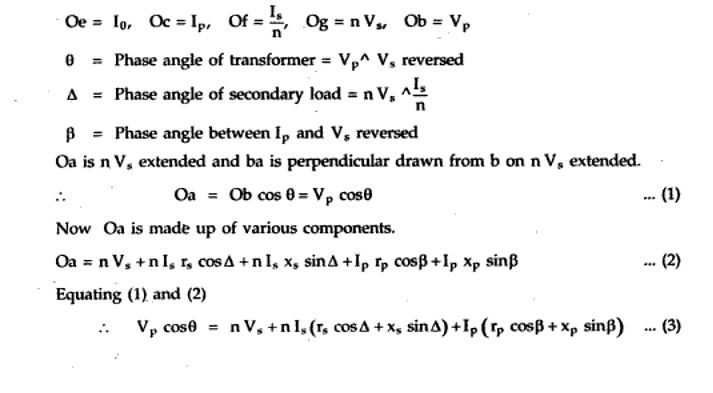
**3.7. Theory of Potential Transformers:**

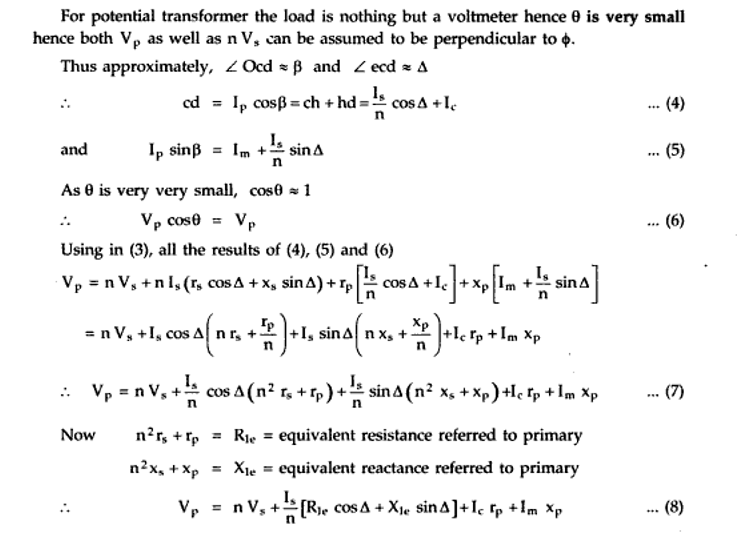
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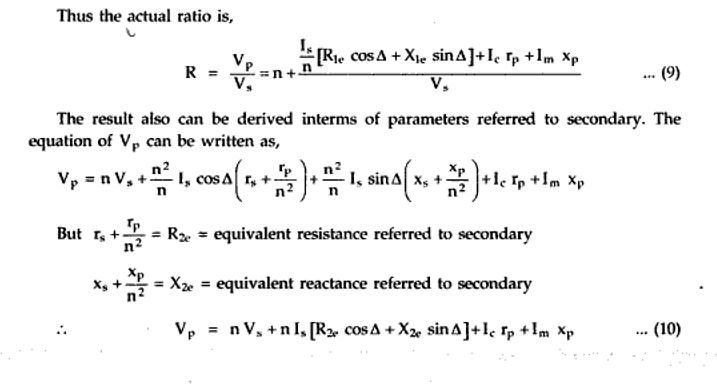
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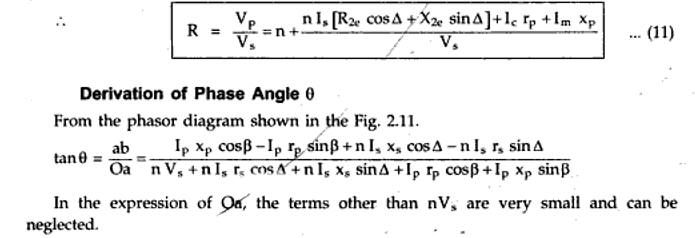
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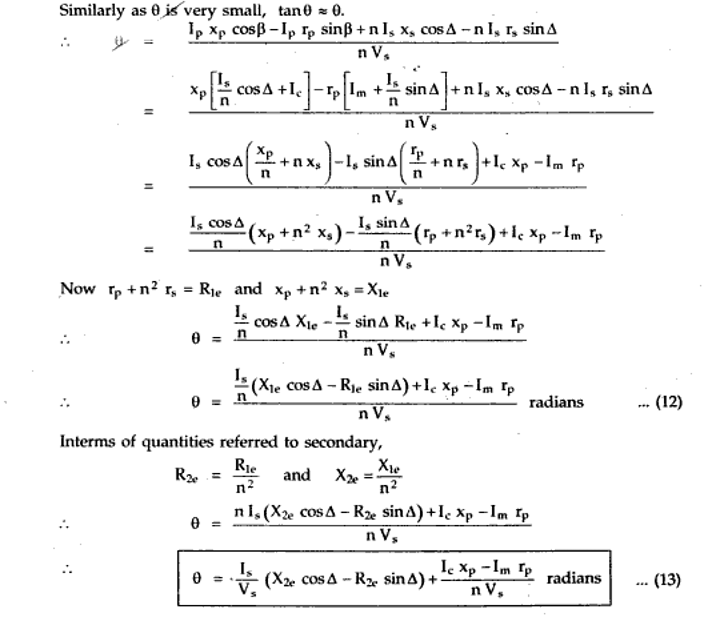
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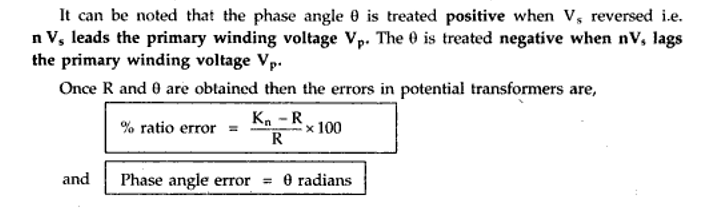
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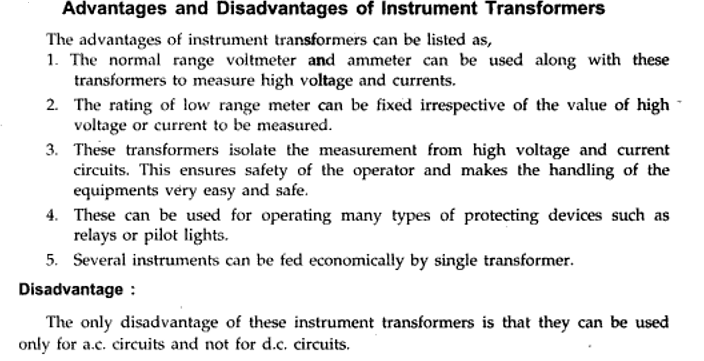
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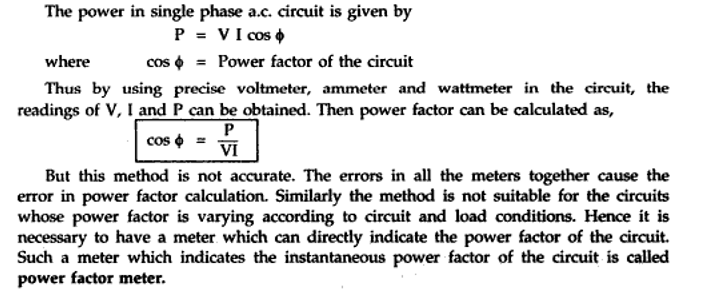
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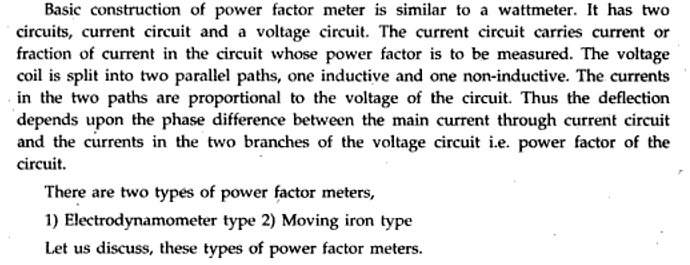
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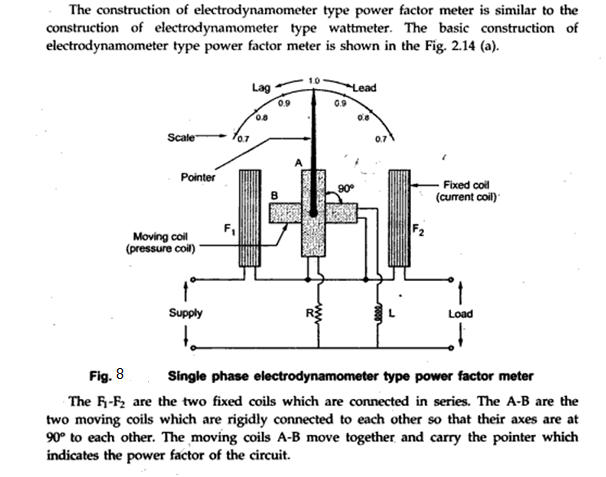
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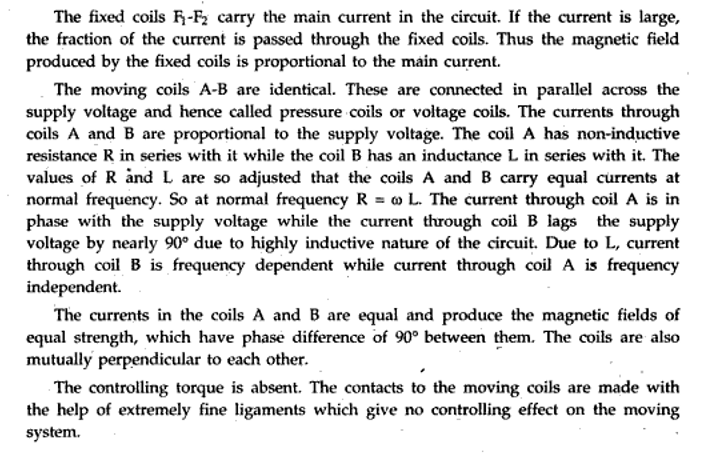
**Power Factor Meters:**

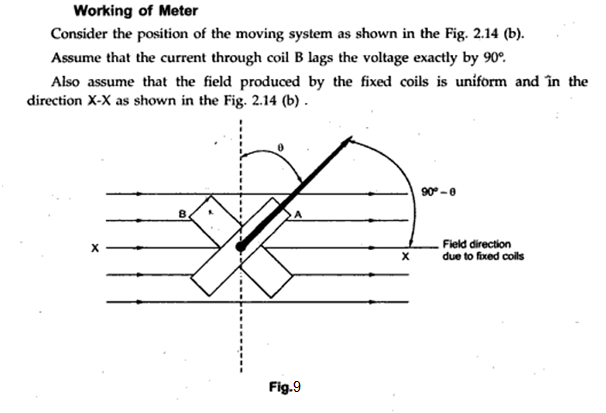
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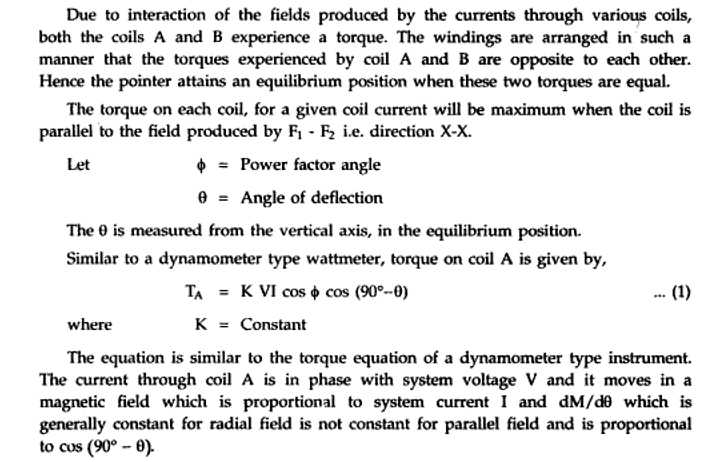
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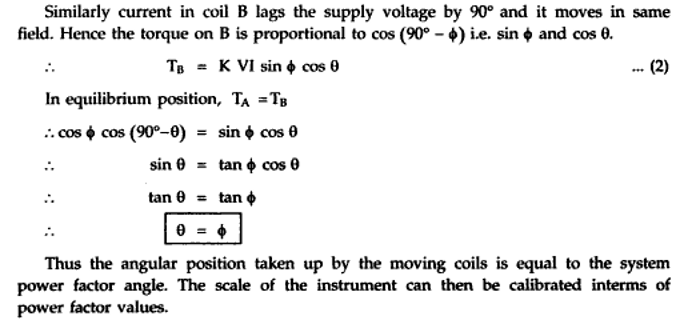
**Single Phase Electrodynamometer type power factor meter:**

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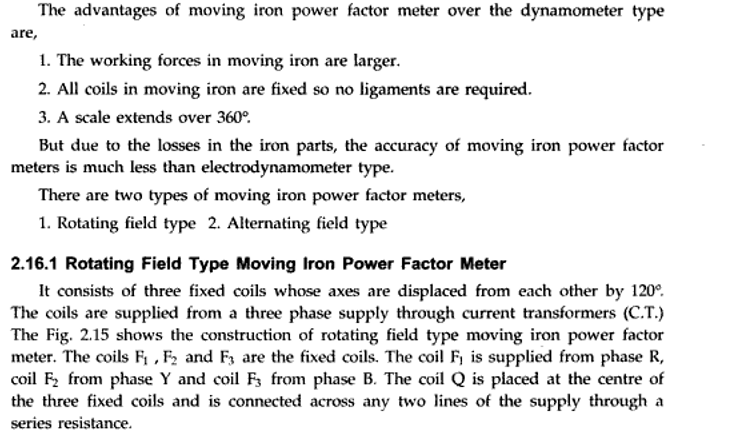
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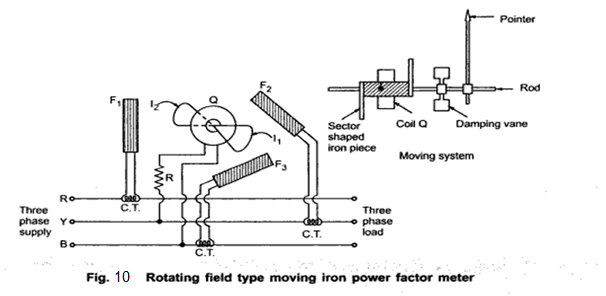
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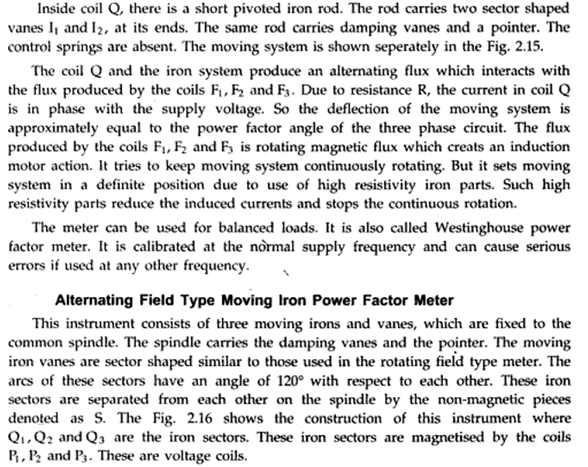
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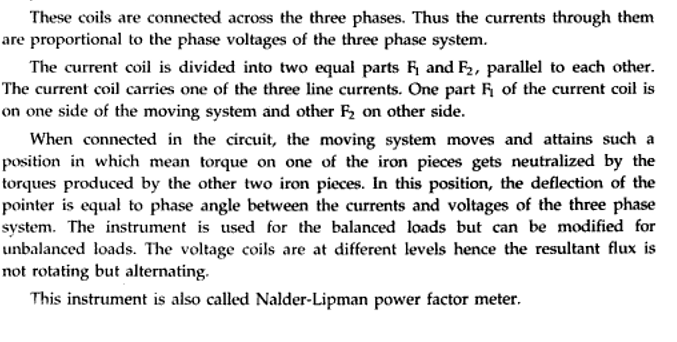
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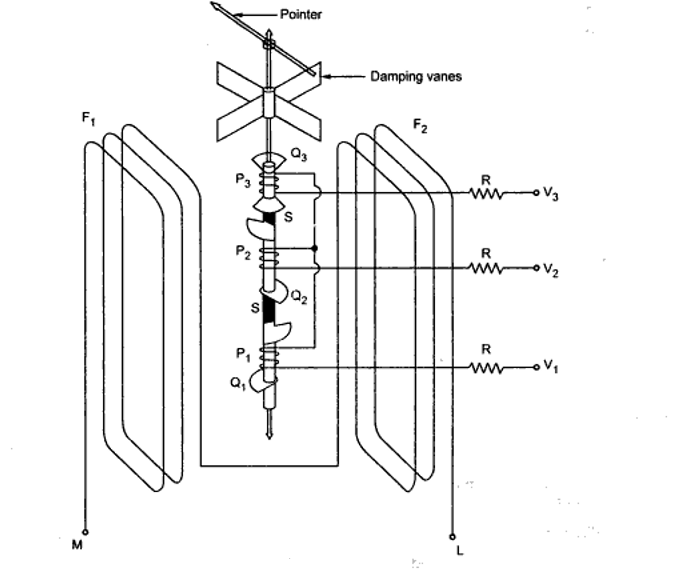
**Moving Iron Power factor meter:**

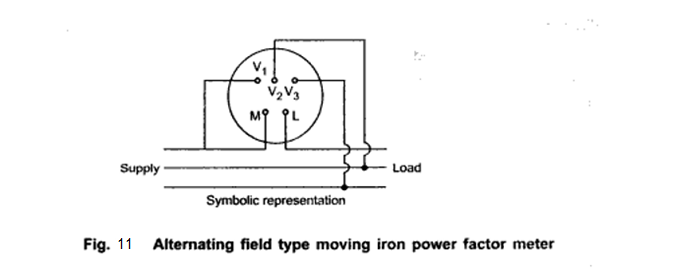
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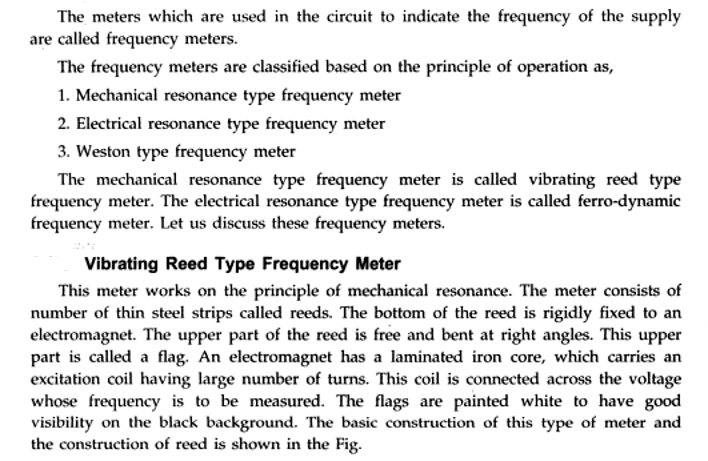
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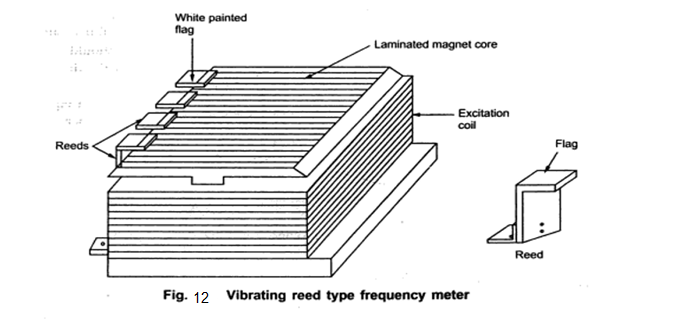
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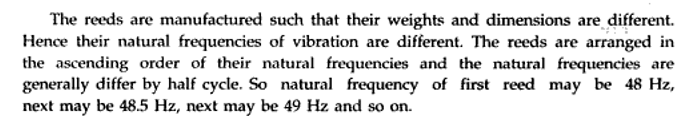
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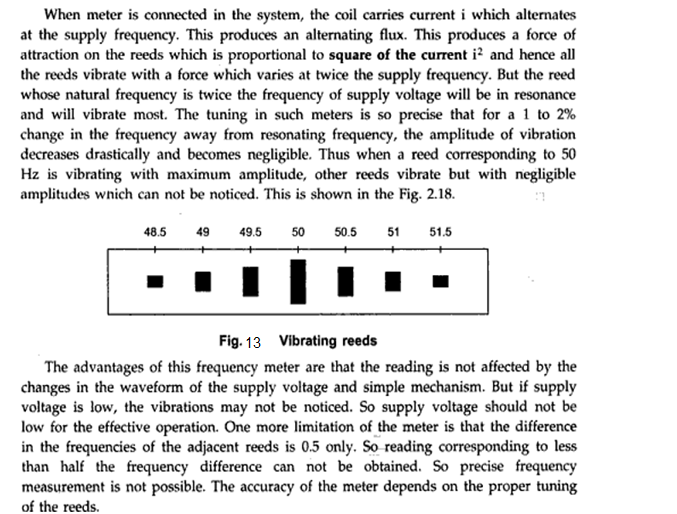
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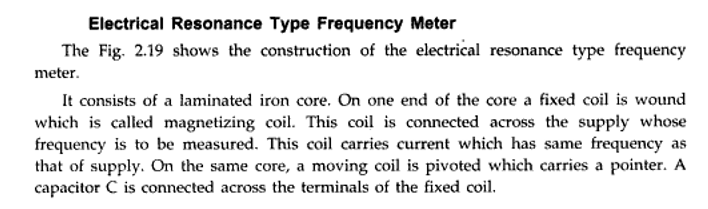
**Frequency Meter:**

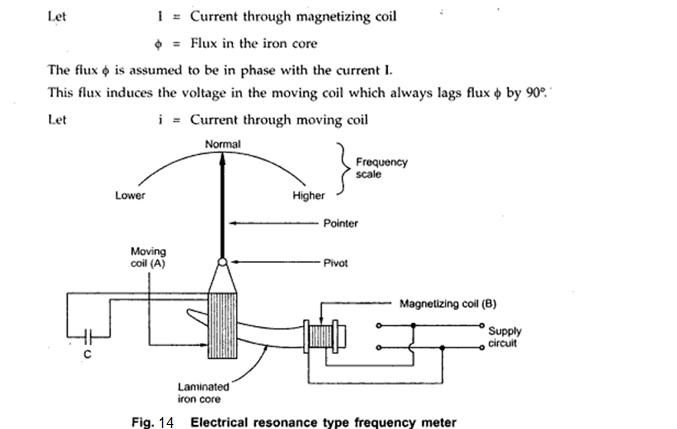
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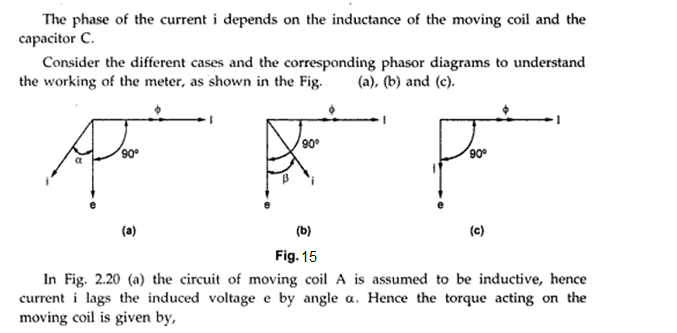
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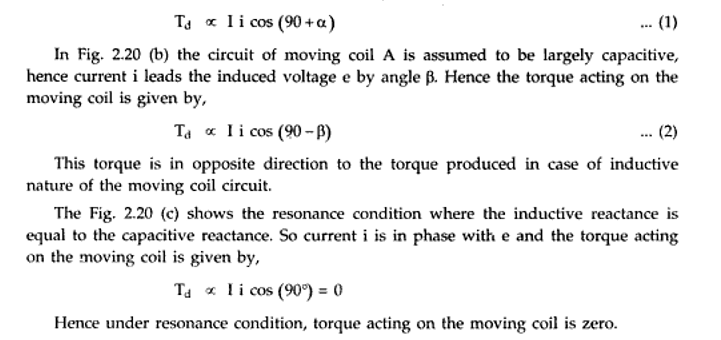
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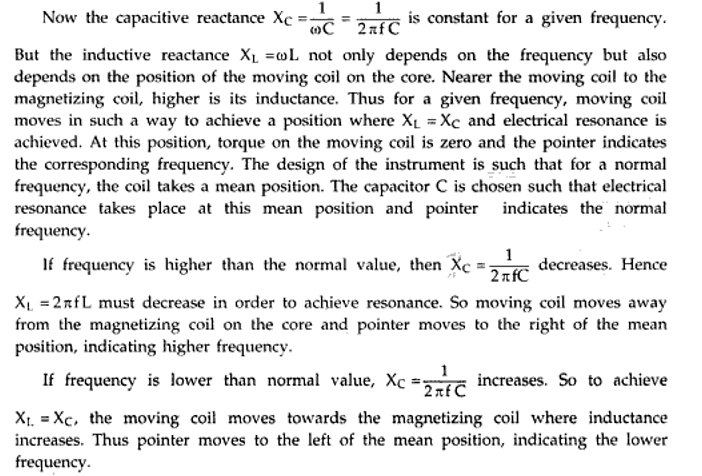
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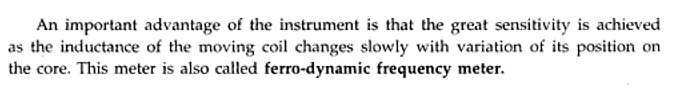
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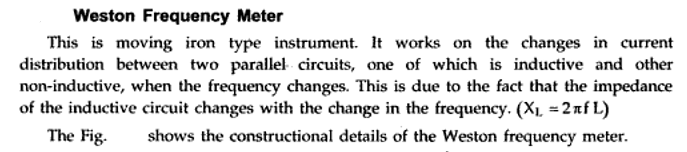
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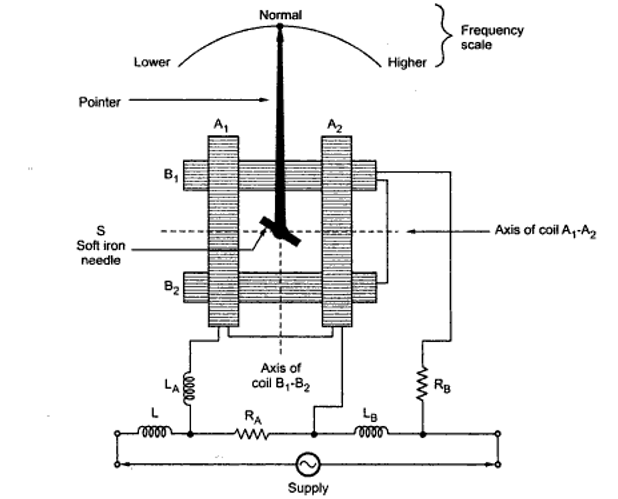
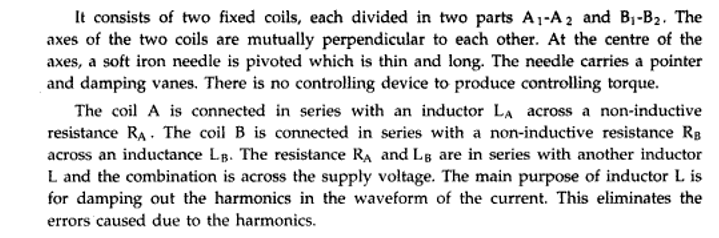
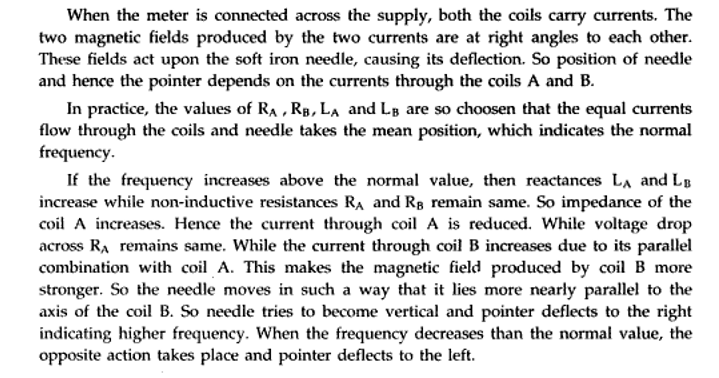
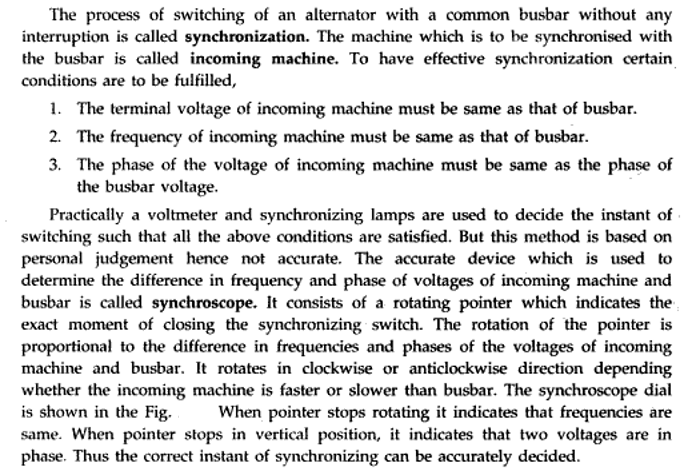
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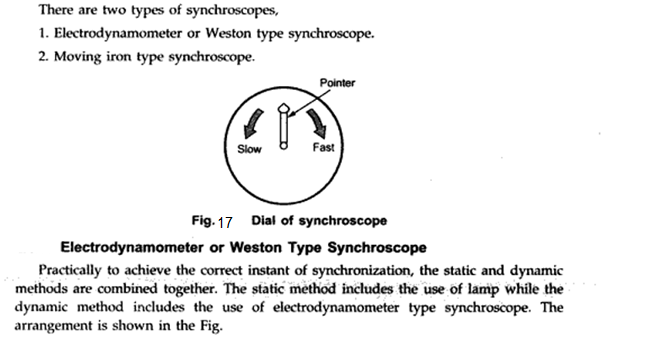
Fig.16.

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**Synchroscopes:**

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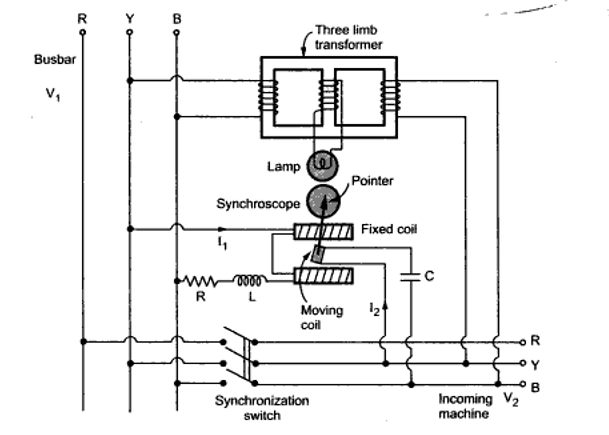
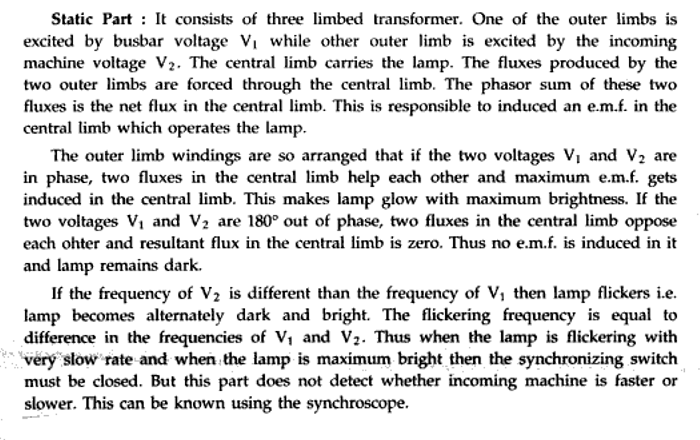
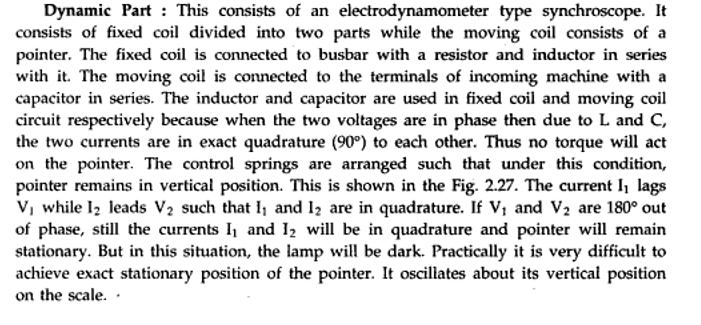
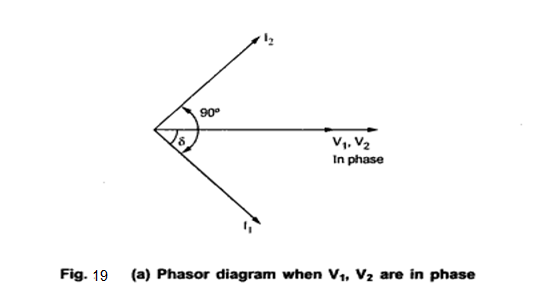
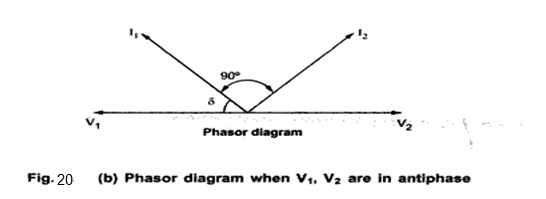
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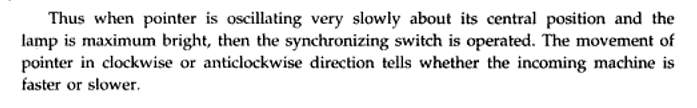
Fig.18

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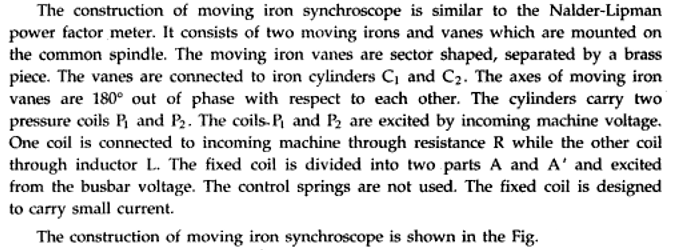
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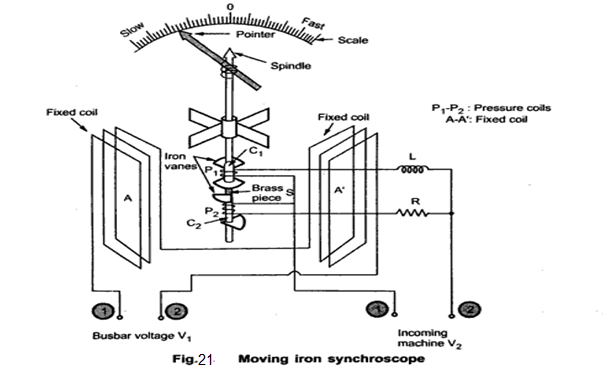
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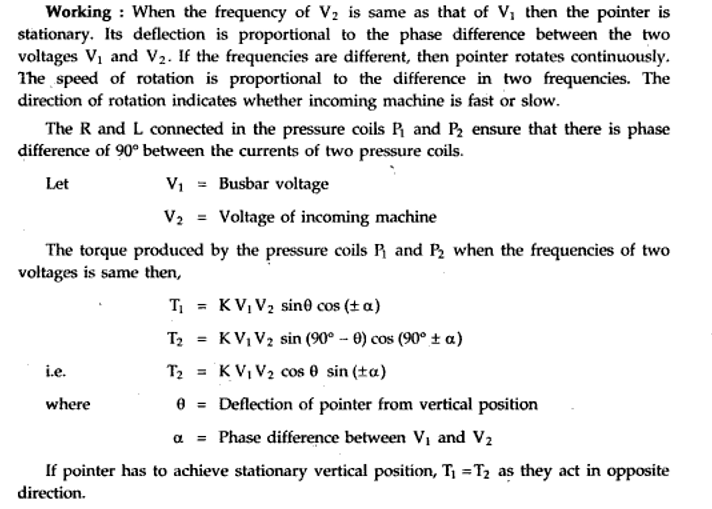
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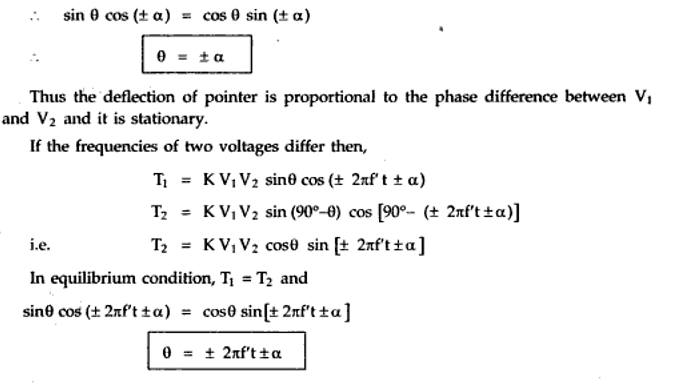
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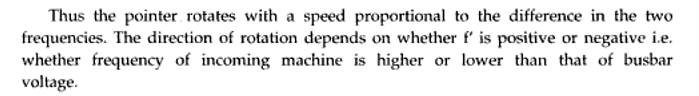
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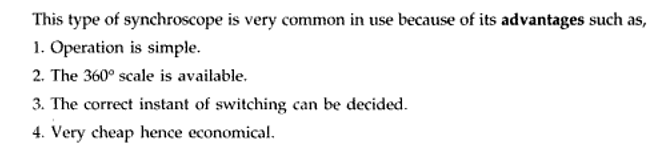
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