12. An inductor having 2 H inductance when connected to 100 V takes 0.318 A current find out the frequency to which it is energised.
(Ans. 25 Hz)
13. An inductor connected to 25 V 60 Hz frequency takes 0.2 current. If it is connected to 12 V 50 c/s. How much current will it draw? What is the inductance of it? **(Ans. 0.1157 A, 0.33 H)**
14. An inductive circuit of negligible resistance limits to 50 mA current at 125 volts a.c. If the working voltage is 12.5 V 200 Hz, estimate its inductance?
(Ans. 0.1989 H)
15. It is required in an electronics network and inductance to limit a current to 0.01 A at 0.5 V 350 KHz. Calculate the inductances to be connected.
(Ans. 0.227 μH)
16. A choke of a fluorescent tube carries 0.43 A when the tube is connected to 230 V 50 Hz. The drop across choke is 166 V. The d.c. resistance is 85 Ω calculate the inductance and inductive reactance of the choke.
(Ans. 1.199 H, 376.57 Ω)
17. An inductive circuit having a resistance of 150 Ω and inductance 0.5 H when connected to 230 V results an impedance of 216.2 Ω. Calculate the supply frequency and power absorbed. **(Ans. 50 c/s, 168.2 Watts)**
18. An inductive circuit draws a current of 40 Amp from 200 V 50 c/s mains at a power factor of 0.75 lagging. Calculate the power consumed, also calculate the active and reactive components of the current.
(Ans. 6 kW, 30 A, 26.5 A)
19. A coil having a resistance of 5 Ω and inductance of 0.02 H is connected across 25 V 50 Hz mains. Calculate the impedance of the coil, the current drawn, the power factor and power consumed.
(Ans. 8 Ω, 3.12 A, 0.625, 48.75 W)
20. Calculate the impedance, current drawn, angle of lagging, power factor, and power consumed by a coil having inductance 0.1 H and resistance as 5 Ω when connected to 230 V 50 Hz mains.
(Ans. 31.8 Ω, 7.23 A. 81°, 0.157, 261 W)
21. Calculate the capacitive reactance offered by a capacitor of 100 μF at 100 V 50 Hz supply. **(Ans. 31.83 Ω)**
22. A 50 μF capacitor is connected to 50 V of certain frequency supply if the current drawn is 0.78 A calculate the supply frequency. **(Ans. 50 Hz)**
23. A coil has a resistance of 4 Ω and an inductance of 6 Ω, find out the current taken by the coil if connected across 250 V 50 Hz. Also calculated the kVA power taken and actual power consumed.
(Ans. 34.7 A, 8.667 kVA, 4.815 kW).
24. A 15 Ω resistance and 0.5 H inductance coil is connected to 230 V 50 Hz. AC supply find the impedance, current taken and power consumed.
(Ans. 157.8 Ω, 1.458 A, 31.87 W)
25. A choking coil of 0.02 H inductance and 4 Ω resistance is connected across 50 V 50 Hz supply, calculate the current taken, power consumed and power factor of the coil. **(Ans. 6.71 A, 180.2 W, 0.537)**

connections of the distribution transformer and secondary winding of the transmission transformers.

Example. *Calculate the phase and line currents in the given circuit Fig. 16.7. Also calculate the power taken from 400 V 50 c/s mains.*

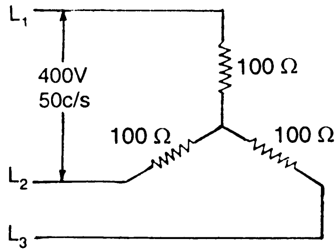

Fig. 16.7.

Solution. The phase voltage

$$= \frac{V_L}{\sqrt{3}} = \frac{400}{\sqrt{3}} = 230.9\,\text{V}$$

Now phase current $= \frac{V_P}{R} = \frac{230.9}{100} = 2.309$ A

In star connections the line current and phase current both are same so the line current = 2.309 A

The power $= \sqrt{3}\,V_L I_L \cos\phi = \sqrt{3} \times 400 \times 2.309 \times 1$

$= 1599.999 \approx$ **1600 W. Ans.**

Example. *Calculate the current taken and power consumed by the given load as shown in Fig. 16.8.*

Solution. The connections, as shown, having 20 Ω resistors connected in delta. The phase voltage is equal to line voltage.

So phase voltage = 100 V

The phase current $= \frac{100}{20} = 5\,\text{A}$

$= \sqrt{3}\,I_P = \sqrt{3} \times 5$

= **8.66 A. Ans.**

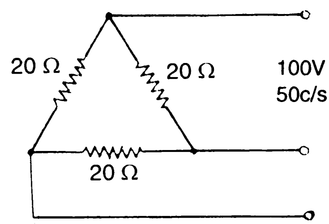

Fig. 16.8.

The line current

$= \sqrt{3}\,V_L I_L \cos\phi = \sqrt{3} \times 100 \times 8.66 \times 1$

= **1499.95 ≅ 1500 W. Ans.**

stability of highest frequency is imparted to low frequency range. The master oscillator may be manual or automatic.

Q. Give the colour coding chart for the resistances.

Ans. Generally the values of the resistances are identified by means of the colour codings. There is a particular arrangement of different colours marked on the resistances to read out the correct value. It can be either by marking a series of colour bands on the resistors or the entire body is coloured and one or two colours are marked on the ends of the resistance which are called tip colours.

The colour coding scheme is given as under table 26.6.

Table 26.6. Colour Code Chart for Resistances

Colour	*Band A*	*Band B*		*Band C or Spot*	*Band D Tolerance %*
Black	0	0	0	1	–
Brown	1	1	1	10	±1%
Red	2	2	2	100	±2%
Orange	3	3	3	1000	±3%
Yellow	4	4	4	10000	±4%
Green	5	5	5	100000	±5%
Blue	6	6	6	1000000	±6%
Violet	7	7	7	10000000	±7%
Grey	8	8	8	100000000	±8%
White	9	9	9	1000000000	±9%
Gold	–	–	–	–	±5%
Silver	–	–	–	–	±10%
No colour	–	–	–	–	±20%

THYRISTOR

Q. What is a thyristor? Which solid state devices are included?

Ans. The thyristor is a term used to include such devices as SCR and triacs etc. The thyristors can be thought of a solid state switches with three or more PN junctions. These are also called PNPN devices etc. These devices are utilized for fast rate (extremely fast) switching ON and OFF. They includes SCR, Diac, triac, silicon unilateral switch, SBS (silicon bilateral switch etc.

SCR. In its simple construction it has four layers with three junctions transistors as shown in fig. These are made of four layers of alternate layers off P type and N type silicon layers.

27

Electric Power

SOURCES OF ENERGY

A number of energy sources are available some of them are main sources like sun, wind, water, radioactive materials and fuels.

The sun is the prime source of energy. The energy from the sun is achieved in the form of heat, light and some radiations like ultraviolet etc. The heat energy and light energy are utilised for generating electric power. The heat energy is used to change water into steam which in Thermal turbines changes into motion and rotates the generator. Thus electricity is produced. The light energy is also changed into electrical energy which is known as Solar power.

In India the conditions are favourable because about six months the heat and light energies are available in abundance, in raining season the water in plenty helps in generating electricity. The water in hydroturbine rotates the generator producing electricity. The wind (the root cause being sun) have got tremendous amount of energy which compels the wind mills to rotate and produce electricity. The other source is the fuel, which can be in all three states solid (coal) liquid (oil) and gas (coal gas). The coal is used in boiler for producing heat which changes water into steam. This steam rotates the thermal turbine and electricity is produced by the generator. In case of liquid, the diesel engines produce the motion to rotate the generator for producing electricity. In gaseous state the gas engines are used to rotate the gas-turbine and electricity is produced. The atomic energy have got a unique field of producing tremendous amount of heat by fission of nucleous disintegration of uranium. The heat thus librated is used through properly controlling to produce steam from water and thereby rotating the generator and producing the electricity.

Thus different sources are used to convert the source energy into mechanical energy which is converted into electrical energy.