Assignment:-2

Note: - All resistances are in ohm (Ω)

1. Three Sinusoidal Voltages acting in series are given by $V_1=10 \sin 440t$, $V_2=10\sqrt{2} \sin (440t-45^0)$, $V_3=20 \cos 440t$
   Determine:-
   (i) An expression fro the resultant voltage
   (ii) The frequency & rms value of the resultant voltage

   Ans:-
   $V=22.36 \sin(440t+26.56^0)$
   f =70 Hz, $V_{rms}=15.81$ V

2. Do as directed
   (i) Show that the instantaneous power consumed in a pure resistive circuit is not constant but it is fluctuating.
   (ii) Show that the Average power consumed by pure L & C is zero.
3. Explain the terms
   (i) Apparent Power (ii) Active Power (iii) Reactive Power (iv) Power Factor

4. Determine (Fig. 1)
   (i) The current & power consumed in each branch.
   (ii) The supply current & power factor.

   Ans:-
   $I_1=10 \angle 45^0$ $I_2=10 \angle -15^0$ $I_3=10 \angle 105^0$
   1000 W, 500 W, 500 W,
   $I=20 \angle 45^0$, P.F.=1.0

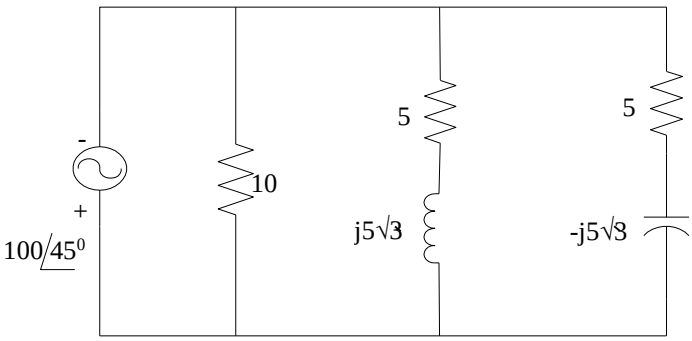

Fig. 1

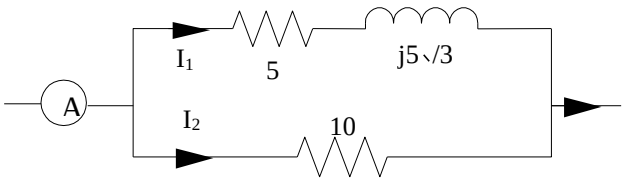

Fig. 2

5. Total power consumed by both branches of the circuit shown in Fig. 2 is 2200 W. Calculate the power of each breach and the reading of the ammeter.

   Ans:-
   $P_1=1200$ W, $P_2=1000$ W, I=19.23 A

6. In the series parallel circuit of Fig. 3 the parallel branches A & B are in series with C. The impedance are Z_A= (4+j3) Ω, Z_B= (10-j7) Ω & Z_C= (6+j5) Ω. If the voltage applied to the circuit is 200 V at 50 Hz, calculate
   (i) Current I_A, I_B & I_C.
   (ii) The total power factor for the whole circuit. Draw vector diagram also.

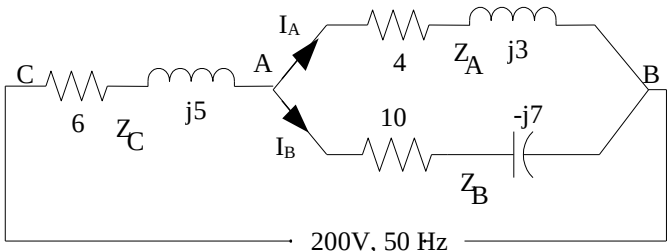

Fig. 3

Ans:-
I_A=14.2 ∠-51.25^0 A, I_B =5.82 ∠20.65^0 A,
I_C=16.95∠-32.2^0 A, P.F = 0.846 lagging

7. Three identical coils connected in delta across 400 V, 50 Hz, 3- phase ac supply, take a line current of 17.32 A at power factor of 0.8 lagging. Calculate (i) The phase current (ii) the resistance and inductance of each coil (iii) the power drawn by each coil. (Ans: I_P=10 A, R_P=32, L=76.4 mH, P= 3200 Watt)

8. With the aid of a phasor diagram show that the power and power factor of a balanced 3-phase load can be measured by two wattmeters.

9. For a certain load, one of the wattmeter reads 20 kW and the other 5 kW. Calculate the power and power factor of the load when (i) both wattmeters read positive value (ii) one wattmeter reads negative value. (Ans.:-25 KW, 0.6933, 15 KW, 0.3273).

10. A 3-phase 500 V motor has 0.4 power factor lagging. Two wattmeters are connected to measure the input, they show the total input to be 30 kW. Find the reading of each wattmeter. (Ans: - 34.843 & -4.843 Watts)

11. Explain the single line diagram of power system.

12. Explain the principle of operation of a single phase transformer. What are the types of transformers?