**UNIT III - THREE PHASE BALANCED SYSTEMS**

***Single Star Load***

68. A balanced three phase load consists of three coils, each of 4Ω resistance and 0.02 H inductance. Determine the total active power when the coils are connected in star, if supply voltage is 400 V, 50 Hz. **[Ans: P(3-phase) = 11.53KW]**

***Single Delta Load***

70. A balanced three phase load consists of three coils, each of 20Ω resistance and 0.4 H inductance. Determine the total active power and reactive power when the coils are connected in delta, if the supply voltage is 440 V,50- Hz. **[Ans: P(3-phase) = 717W; Q(3-phase) = 4.51KVAR]**

***Extra Problems***

73. A balanced 3Ф, star connected load of 100KW takes a leading current of 80A when connected to a 3Ф, 1.1KV,50Hz supply. Find the resistance, impedance and the capacitance of the load per phase. Also calculate the power factor of the load. **[Ans: Zph = 7.937∟-49°Ω; Rph = 5.21Ω; C=531µF; cos Ф=0.656(lead)]**

74. A balanced 3Ф star connected load is supplied from a symmetrical 3Ф 400V system. The current in each phase is 30A and lags by 30o behind the voltage. Find i) impedance in each phase ii) total power drawn. Draw phasor diagram. **[Ans: Zph = 7.698Ω; P(3-phase) = 18KW]**

75. A 3Φ delta connected load, each phase has a impedance of (25+j40)ohms. The load is fed from the secondary of a 3Φ star connected transformer which has phase voltage of 240V. Draw the circuit diagram and calculate: i) current in each phase of the load, ii) voltage across each phase of the load, iii) current in the transformer secondary winding, iv) power supplied by the load.

76. A balanced delta connected load consumes 2 KW of power when connected to a three phase, 400 V, 50Hz supply. The same load when connected to a three phase 230 V,50 Hz supply, draws a current of 2 A at lagging power factor. Determine the load power factor and resistance and inductance per phase. **[Ans: pf = 0.829(lag), Rph = 165.12Ω, Lph = 0.354H]**

77. The load connected to a three phase supply comprises three similar coils connected in star. The line current is 25 A, the real and apparent powers are 11KW, 20 KVA. Find the line voltage, resistance and reactance of each coil. If the coils are connected in delta find the line current and power taken. **[Ans: VL = 461.88V, Rph = 5.86Ω, Xph = 8.9Ω, in delta, IL = 75A, P(3-phase) = 33KW]**

***Two - Wattmeter Method***

78. In a balanced three phase system, power is measured by two wattmeter method. The ratio of two readings of wattmeter are found to be 2:1. Determine the power factor of the system. **[Ans: pf = 0.866]**

79. The power input to a synchronous motor is measured by two wattmeters both of which indicate 50kW. If the power factor of the motor be changed to 0.866 lead. Determine the readings of the two wattmeters the total input power remaining the same. Draw the phasor diagram for the second condition of the load. **[Ans: W1 = 33.33KW, W2 = 66.67KW]**

**Question No. 81 is same as Question No. 79**

80. Calculate the readings of the two wattmeters ( W1&W2 ) connected to measure the total power for a balanced star-connected load shown in Fig, fed from a three-phase, 400 V balanced supply with phase sequence as R-Y-B. Also find the readings of meters if they are connected in delta. **[Ans: In Star, W1 = 1.451KW, W2 = 3.67KW; In Delta, W1 = 4.35KW, W2 = 11KW]**

82. A 3- phase, Υ-connected, balanced load with a lagging power factor is supplied at 400 V (between lines). A wattmeter when connected with its current coil in the R-line and voltage coil between R and Y lines gives a reading of 6kW. When the same terminals of the voltage coil are switched over to Y- and B-lines, the current coil connections remaining the same, the reading of the wattmeter remains unchanged. Calculate the line current and power factor of the load. Phase sequence is RYB. **[Ans:** **IL = 30A; pf = 0.866(lag)]**