GANPAT UNIVERSITY
U. V. PATEL COLLEGE OF ENGINEERING
B.TECH. SEM-I
2ES103: BASIC OF ELECTRICAL ENGINEERING
3-PHASE CIRCUITS
4: ASSIGNMENT &TUTORIAL

Part – I Multiple Objective Questions (MCQ)

1. The power taken by a 3-phase load is given by the expression
   A) $3V_L I_L \cos\theta$ 　　B) $\sqrt{3}V_L I_L \cos\theta$
   C) $3V_L I_L \sin\theta$ 　　D) $\sqrt{3}V_L I_L \sin\theta$

2. In two wattmeter method of power measurement, if one of the wattmeter shows zero reading, then it can be concluded that
   A) Power factor is unity 　　B) Power factor is zero
   C) Power factor is 0.5 lagging 　　D) Power factor is 0.5 leading

3. Two wattmeters, which are connected to measure the total power on a three phase system supplying a balanced load, read 10.5 kW and −2.5 kW, respectively. The total power and the power factor, respectively, are
   A) 13.0 kW, 0.334 　　B) 13.0 kW, 0.684
   C) 8.0 kW, 0.52 　　D) 8.0 kW, 0.334

4. In a three-phase system, the voltages are separated by
   A) 45° 　　B) 90°
   C) 120° 　　D) 180°

5. In a three-phase system, when the loads are perfectly balanced, the neutral current is
   A) zero 　　B) one-third of maximum
   C) two-thirds of maximum 　　D) at maximum

6. In a Y-connected circuit, the magnitude of each line current is
   A) one-third the phase current 　　B) three times the corresponding phase current
   C) equal to the corresponding phase current 　　D) zero

7. If in a Y-connected ac generator, each phase voltage has a magnitude of 90 V$_{RMS}$, what is the magnitude of each line voltage?
   A) 0 V 　　B) 90 V
   C) 156 V 　　D) 180 V

8. In a Y-connected circuit, between each line voltage and the nearest phase voltage, there is a phase angle of
   A) 0° 　　B) 30°
   C) 60° 　　D) 120°

9. In a $\triangle$-connected generator, all of the phase voltages are
   A) zero 　　B) equal in magnitude
   C) one-third of total 　　D) one-sixth of total

10. The phase sequence of a 3-phase system is RYB. The same phase sequence can be represented as
    A) YBR 　　B) BRY
    C) Both A and B 　　D) None of the above

Part – II Shorts Questions(1 & 2 Marks)

1. What is balanced voltage?
2. What is balanced impedance?
3. What is phase sequence?
4. Write the relation between the line and phase value of voltage and current in a balanced star connected load.
5. Write the relation between the line and phase voltage of voltage current in a balanced delta connected load.
6. Write the relation between the power factor and wattmeter readings in two-wattmeter method of power measurement.

Part – III Examples

1. A balanced three phase star connected load of 18kW taking a leading current of 60 amperes when connected across a 3 phase 440V 50 Hz supply. Find the values and nature of the load.
   Ans: (i)Vp=254V(ii)Ip=60A(iii)Z=4.234ohm(iv)p.f=0.39365(v)R=1.6667ohm (vi)X=3.89242ohm(vii)capacitive

2. A three phase 500V motor load has power factor of 0.4, Two wattmeters connected to measure the power show the input to be 30kW.Find the reading on each wattmeter.
   Ans: (a) w1=34.843kW (b) w2 = -4.843kW

3. In two wattmeter method power measured was 30kW at 0.7pf lagging. Find the reading of each wattmeter.
   Ans: (i) w1= 23.835Kw(ii) w2=6.165kW

Part – IV Long Questions   (Only For Preparation)

1. For delta connected system in 3 phase circuit prove that $V_L = V_{ph}$ and $I_L = \sqrt{3} \, I_{ph}$.
2. Define phase current and line current and obtain the relationship between phase quantity and line quantity for 3 phase star connected system.
3. Explain Two wattmeter method for measurement of 3-phase power and prove that $W_1 + W_2 = \sqrt{3} V_L I_L \cos\varphi$.

*Notes: Students have to write only Part I, Part II, Part III