Theoretical Question Collection on Basic Electrical Engineering

1. Describe in brief the generation, transmission, distribution and consumption of electrical energy with the help of single line diagram.
2. Explain present energy scenario and role of electricity in context of Nepal.
3. Explain the importance of electricity in real life. How the life would be in the absence of electricity?
4. What are the ideal and non – ideal (practical) sources? Explain each briefly.
5. Define active and passive elements.
6. Illustrate about voltage divider and the current divider circuit.
7. State and explain Ohm's law. Also write its limitations.
8. State superposition theorem.
9. What is power factor and explain its significance.
10. State and explain Norton's theorem with an appropriate example.
11. Compare mesh analysis and the nodal analysis.
12. Compare Thevenin's theorem with Norton's theorem.
13. State maximum power transfer theorem. Prove that the maximum power transferred to the load is $v_{th}^2 / 4R_{th}$.
14. Write the difference between series resonance and parallel resonance.
15. Define resonance in electric circuit. Explain the variation of inductive reactance, capacitive reactance, impedance and current with frequency in RLC series circuit. Also, find the resonant frequency in RLC series circuit.
16. Show that the bandwidth for the series resonant circuit is the ratio of resonant frequency and quality factor.
17. Explain resonance in parallel RLC circuit.
18. Show that bandwidth of RLC resonance AC series circuit is $W = R/L$ rad/ sec, where symbols have their usual meanings.
19. What is a phasor? Determine the current – voltage relationship for passive elements in phasor domain as well as time domain.
20. Explain how the 3 - phase voltage is generated. Write the advantages of 3 phase system over single phase.
21. With neat sketch and appropriate phasor diagram explain two wattmeter method of 3 – phase power measurement.
22. Explain the differences between single phase and three phase system.
23. List out the advantages and disadvantages of star connected supply.
24. Derive the relationship between phase and line voltage in a star connection with the help of neat and clean phasor diagram in 3 - phase system.
25. Write short notes on:
    a. Color coding of resistance
    b. Star – delta transformation
    c. Power factor and its significance
    d. Analogy between magnetic and electric circuit
    e. Quality factor of RLC series circuit
    f. Operation of transformer on – load
    g. Speed control of DC motor
    h. Losses in transformer
    i. Losses in rotating machine
26. Define transformer and deduce the expression for EMF.
27. Explain the practical transformer with the help of phasor diagram with unity power factor load.
28. What are generators? Explain the types of excitation systems in separately excited DC generator.
29. Explain the construction and working principle of three phase induction motor.