Question Bank

Power system Analysis (EE- 601)

Q.1- Discuss the phenomenon of travelling wave over transmission line. Establish the relation between the V & I waves travelling over the transmission line & for their velocity of propagation. Also calculate the velocity of wave propagation for OH line.

Q. 2- Discuss the reflection phenomenon of travelling wave of voltage & current for a line terminated with a) Resistive load, b) through a cable & obtain reflection coefficient.

Q. 3- Discuss the behavior of a travelling wave when it is reaches a) Short circuited, b) open circuited, c) line terminated by impedance equal to Z_0.

Q. 4- Why the indoor transformers are usually connected to the OH Lines through short length of cables?

Q. 5- Explain the procedure for drawing Bewley's lattice diagram with the suitable example. An overhead line with Z_0 400 ohm is connected to a terminal apparatus through a cable of Z_0 40 ohm. A travelling wave of constant magnitude of 100 kV & infinite duration originates in OH line & travels towards the junction with the cable. Calculate the energy transmitted into the cable during a period of 5 microsec. after the arrival of the wave at the junction.

Q. 6- Deduce the general expression for reflection & refraction coefficient of travelling wave. Derive the formula for velocity.

Q. 7- Discuss the protection of equipment & line against travelling wave.

Q. 8- Make the analysis of a wave travelling along a line terminated with an inductance L. Derive an expression for voltage across L at the end of transmission line of surge impedance Z_c when a step wave of magnitude E is travelling along it.

Q. 9- An OH line with Z_0 500 ohm is bifurcate into two lines of Z_0 500 & 50 ohm. If a surge of 25 kV is incident on the OH line determine the magnitude of 25 kV is incident of voltage & current which enter the bifurcated lines.

Q. 10- Explain Steady state stability, Dynamics stability, transient stability. Also explain the factors affecting transient stability and various techniques for improvement of transient stability.

Q.11- Deduce the swing equation of a synchronous machine connected to an infinite bus and its solution by point- to- point method.

Q.12- Derive and discuss equal area criterion for transient stability analysis. And also discuss the concept of transient stability when sudden change in mechanical input of an alternator takes place.

Q.13- Derive expression for critical clearing angle when sudden short circuit occurs on one of two parallel lines away from the alternator ends in the system.

Q.14- Show that the steady state power which could be transmitted over a transmission line will be maximum when $X = \sqrt{3}\ R$.

Q.15- Explain per unit system and its advantages over absolute method of analysis. Show Z_{PU} of a transformer is same either it is calculated from primary or secondary side.

Q.16- Discuss the criterion for selecting circuit breaker. Discuss the use and location of current limiting reactors in a power system & explain their advantages.

Q.17- Discuss about the impedance and reactance diagram. What is the difference between one line diagram and impedance diagram? Explain with the help of examples.

Q.18- What do you understand by symmetrical components of unbalanced phasors? Deduce the expression for symmetrical components. If $I_R = 200\angle 30^0$, $I_Y = 100\angle 300^0$, $I_B = 60\angle 180^0$, Calculate I_0, I_1, I_2in R line & return current in neutral wire.

Q.19- What do you understand by sequence network? What is their importance in unsymmetrical fault calculation? Explain zero sequence network of transformer for (i) star neutral grounded/ star neutral grounded, (ii) delta/delta, (iii) star neutral grounded/ delta, (iv) star neutral isolated/delta.

Q. 20- Write short note on reactance of an alternator when sudden short circuit occurs on its terminals. An alternator rated 500 kVA, 400 V, 0.1 pu sub transient reactance is supplying a passive load of 400 kW at 0.8 pf lagging. Calculate initial symmetrical current for a 3 phase fault at generator terminals.

Q.21- Derive the expression for symmetrical components of fault current for LL fault with interconnection of symmetrical network.

Q.22- Show that the Z0 of a generator with neutral grounded through an impedance of Zn is (Zs + 3Zn). An 11kV, 25 MVA alternator has Z0, Z1, Z2 of 0.08, 0.128, 0.12pu respectively. The generator neutral is grounded through a reactor of 0.03 pu. Determine I_f when LG fault occurs at generator terminal. Also calculate the line to line fault voltage.

Q. 23- A 25 MVA, 132 kV alternator with solidly grounded neutral has a sub transientreactance of 0.25, Z2 & Z0 are 0.35 & 0.1 pu respectively. Determine fault current and line to line voltage at fault when LLG fault occurs at terminals of alternator. **Deduce the expression used.**

Q. 24- Prove that for the transmission Z0 is much larger than the Z1. Also discuss the effect of mutual impedance.

Q.25- Derive the load floe equation for N-R method. Also write the algorithm for the solution of load flow problem using N-R method.

Q. 26- Discuss the procedure and algorithm for load flow analysis using Gauss- Siedel method.

Q. 27- Discuss the purpose of load flow studies of a power system. Also classify the buses for load flow analysis.

Q. 28- Discuss the decoupled and fast decoupled method of load flow analysis.

Q. 29- Discuss the mathematical model of a tape changing transformer in Y bus formation.