Dronacharya Group of Institutions, Greater Noida

Electrical & Electronics Engineering Department

Question Bank

Subject: Elements of Power System (NEE-501) **Branch: EEE 5th Semester**

Q. 1: Discuss the single line diagram in detail.

Q. 2: Discuss the following in brief:- Synchronous machine, Transformer, Transmission line.

Q. 3: Compare the weights of conductor required in transmission system- (a) DC 2- wire midpoint earthed system, (b)1- phase 2 wire system, (c) 3-phase 3- wire system, (d) 3- phase 4- wire system. Assume same power transmitted & max. voltage between conductors, & same losses in each case.

Q. 4: A 50 km long line supplies a load of 50 MVA at 0.8 pf lagging at 33 KV. The efficiency of line is 90%. Calculate the volume of conductor Aluminium required for the line when (a) 1- phase, 2- wire system is used, (b) 3- phase, 4- wire system is used.

Q. 5: Explain the bus bar, circuit breaker, and isolator in brief.

Q.6: What is a good choice of transmission voltage?

Q. 7: What are different types of conductors? Explain them briefly.

Q. 8: Explain the following in details- ACSR, smooth body ACSR, expanded ACSR.

Q. 9: What is Kelvin's law? Discuss the modified Kelvin's law. What are the limitations of Kelvin's law?

Q. 10: The daily load cycle of a 3-phase, 33 KV, 10 km line is as follows- 2500 KVA for 8 hrs., 2 MVA for 9 hrs. & 1.5 MVA for 7 hrs. Determine most economical cross-section if the cost of line including erection is Rs. (7500+ 6000a) per km. The rate of interest and depreciation is 8% and cost of energy is 15 paisa per unit. The line is in use for 250 days a year. Resistance of conductor is 0.173 ohm per km and per sq. cm.

Q. 11 : Explain inbrief-

(I) the bus bar, (ii) circuit breaker, (iii) isolator, (iv)Transmission line, (v)transformer.

Q. 12: Compare the weights of conductor required in transmission system- (a) DC 2- wire midpoint earthed system, (b)1- phase 2 wire system, (c) 3-phase 3- wire system, (d) 3- phase 4- wire system. Assume same power transmitted & max. voltage between conductors, & same losses in each case.

Q. 13: A 50 km long line supplies a load of 50 MVA at 0.8 pf lagging at 33 KV. The efficiency of line is 90%. Calculate the volume of conductor Aluminium required for the line when (a) 1- phase, 2- wire system is used, (b) 3- phase, 4- wire system is used.

Q. 14: What is a good choice of transmission voltage?

Q. 15: What are different types of conductors? Explain ACSR, smooth body ACSR, expanded ACSR briefly.

Q. 16: Calculate the capacitance of a 3 phase line with unsymmetrical spacing with transposition and symmetrical spacing.

Q. 17: Calculate the inductance of a 2 wire line. A 3 phase line consists of 3 conductors each of diameter is 21 mm. spacing between conductor is- AB = 3m, BC = 5m, CA= 3.6m. Find inductance & inductive reactance per km. of line.

Q. 18: What is Kelvin's law? Discuss the modified Kelvin's law. The daily load cycle of a 3-phase, 33 KV, 10 km line is as follows- 2500 KVA for 8 hrs., 2 MVA for 9 hrs. & 1.5 MVA for 7 hrs. Determine most economical cross-section if the cost of line including erection is Rs. (7500+ 6000a) per km. The rate of interest and depreciation is 8% and cost of energy is 15 paisa per unit. The line is in use for 250 days a year. Resistance of conductor is 0.173 ohm per km and per sq. cm.

Q. 19: What is meant by the disruptive critical voltage and visual critical voltage? State the effects of the conductor size, spacing and condition of the surface of conductors on these voltages?

Q. 20: What is corona loss? How can it be reduced?
A 3-phase, 220 kV, 50 Hz transmission line consists of 15 mm radius conductor spaced 2 m apart in the form of an equilateral triangle. If the temperature is 40 deg C and atmospheric pressure is 76 cm, calculate the corona loss per km of the line. Assume irregularity factor as 0.85.

Q. 21: A string of 6 insulators units has a self-capacitance equal to 10 times the pin to earth capacitance. Find the voltage distribution across various units as a percentage of the line voltage to earth, the string efficiency.

Q. 22: Find the disruptive critical and visual corona voltages of a grid-line operating at 132 kV. The following data is given:
Conductor diameter = 1.9 cm; conductor spacing = 3.81 m; temperature = 44 deg C; barometric pressure = 73.7 cm; conductor surface factor: fine weather = 0.8, rough weather = 0.66.

Q. 23: Determine the efficiency and regulation of a 3-phase, 100 km, 50 Hz transmission line delivering 20 MW at a p.f. Of 0.8 lagging and 66kV to a balanced load. The conductors are of copper, each having resistance 0.1 ohm per km, 1.5 cm outside dia, spaced equilaterally 2 meters between centers. Neglect leakance and use (i) nominal-T, and (ii) nominal-Π method.

Q. 24: Discuss briefly the factors, which affect the sag.

Q. 25: An overhead line has a span of 200 m between level supports. The conductor has a cross-sectional area of 1.29 cm2 and weighs 1.17 kg / m and has a breaking stress of 4218 kg / cm2. Allowing a wind pressure of 122 kg / m2, calculate the sag for a factor of safety of 5.

Q. 26: Explain the phenomena of corona.

Q. 27: List the advantages of suspension type insulators over pin type insulators.
Q. 28: Discuss the effect of wind and ice on sag. What is stringing chart? What is its utility?

Q. 29: Calculate the permittivity of the dielectric in a cable, the core diameter of which is 1.5 cm and sheath diameter is 5-cm. For a length of 3000 meters of cable, the insulation resistance is 1820 M-ohm.

Q. 30: How are the transmission line insulators classified? Three disc insulators are supporting a 3-phase overhead transmission line. The potentials across top unit and middle unit are 9 kV and 1 kV respectively. Calculate: the ratio of capacitance between pin and earth to the self –capacitance of each unit, the line voltage, and the string efficiency.