

Duration – 3 Hours

Total Marks - 80

- N.B.:** - i) Question No.1 is compulsory.
 ii) **Attempt** any **Three** questions from Q2. to Q6.
 iii) Assume suitable data if necessary and justify the same.
 iv) Figures to right indicate full marks

Q 1. Answer **all** questions.

- A) Why long transmission lines are transposed? **05**
 B) Why pin insulators are used for low voltage and suspension insulators are used for high voltages **05**
 C) Discuss the imperfect behavior of cables. **05**
 D) Discuss why the representation of line by lumped parameter gives inaccurate results for long lines **05**

Q 2 a) Derive the equation for economical choice of voltage **10**

Q 2 b) A 400 KV 3 phase bundle conductor line with two sub conductor per phase has a horizontal configuration. The horizontal distance between sub conductors is 45 cm. Radius of a sub conductor is 1.6 cm. Horizontal distance between the conductors is 12m. Find the inductance per phase per km of line. Compute the inductance of line with only one conductor per phase having the same cross sectional area of the conductor of each phase. **10**

Q 3 a) Derive an equation for inductance due to internal flux linkages. **10**

Q 3 b) A 220 KV 50 HZ 200 Km long 3 phase line has its conductor on the corner of a triangle with the sides 6m,6m,12m .the conductor radius is 1.1 cm. Find the capacitance per phase per km , capacitive reactance, charging current and total charging volt amperes. **10**

Q 4 a) Derive the equation for capacitance of three phase line equilateral spacing. **10**

Q 4 b) A line has a string of three suspended insulators, with a self-capacitance of C farads. The shunt capacitance of each insulator is 0.26C to earth and 0.15C to line. Find the string efficiency if a guard ring increases the shunt capacitance to line of metal work of the lowest insulator to 0.35C. **10**

- Q 5 a) Discuss the following terms with respect to transmission line propagation constant, Ferranti effect, and tuned power lines. **10**
- Q 5 b) A 15 km long 3 phase overhead line delivers 5 MW at 11KV at a power factor of 0.8 lagging. Line loss is 12 % of power delivered. Line inductance is 1.1mH/Km. Calculate sending end voltage and regulation, power factor of load to make regulation zero. **10**
- Q 6 a) Explain the per unit method of computation? **10**
- Q 6 b) Discuss the measurement of earth resistance and soil resistivity **10**
