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FIFTH SEMESTER B.TECH. EE/EL

SUPPLEMENTARY EXAMINATION Feb,2019

EE/EL 303POWER TRANSMISSION AND DISTRIBUTION

Time: 3 Hours *Max. Marks : 40*

Note : Answer any eight questions. All questions carry equal marks. Assume suitable missing data, if any.

1. a) Draw the single line diagram for transmission and distribution system. What are the advantages of using HVAC system.
2. Derive expressions for the inductance per phase per meter of a 3-phase line with
   (i) equilateral spacing
   (ii) unsymmetrical spacing. Assume transposition in (ii).
3. What is the percentage saving in feeder copper if the line voltage in a two wire dc system be raised from 110 V to 250V for the same power transmitted?
4. A three phase 50Hz transmission line 120Km long delivers 10 MW at 0.8 pf lag at 66KV .The impedance and admittance of the line is $(0.1+j0.3)$ ohms/phase/km of $0+j0.04\times10^{-4}$ S/phase/km respectively. Calculate (a) the sending end voltage (b) sending end current (c) efficiency of transmission. Use nominal T method.
5. Explain Ferranti effect with the help of phasor diagram.
6. Derive an expression for sag and tension in a power conductor strung between two supports at equal heights considering wind and ice loading effect.
7. A 33kV, 3-phase underground cable, 4km long, uses three single cables. Each of the conductors has a diameter of 2.5cm and the radial thickness of insulation is 0.5cm. The relative permittivity of the dielectric is 3.0. Determine
   (a)Capacitance of the cable/phase.
   (b) Charging current/phase.
8. In a 3-phase overhead line, each conductor has a diameter of 30mm and are arranged in the form of an equilateral triangle. Assuming fair weather conditions, air density factor of 0.95 and

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irregularity factor 0.95, find the minimum spacing between the conductors if the critical disruptive voltage is not to exceed 230kV between lines. Breakdown strength of air may be assumed to be 30kV per cm(peak).

9. A string of suspension insulators consists of four units. The capacitance between each link pin and earth is one-tenth of the self capacitance of a unit. The voltage between the line conductor and earth is 100kv Find voltage distribution across each unit

10. Explain in detail the following(any two)
   (i) Methods to improve string efficiency of the insulators.
   (ii) Surge diverters.
   (iii) Capacitance grading of cables.