AJAY KUMAR GARG ENGINEERING COLLEGE, GHAZAIABAD

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

SESSIONAL TEST – 2

Course: B. Tech
Session: 2017-18
Subject: Elements Of Power System
Max. Marks: 50

Semester: V
Section: EN-1, 2
Sub. Code: NEE 501
Time: 2 hour

Section-A

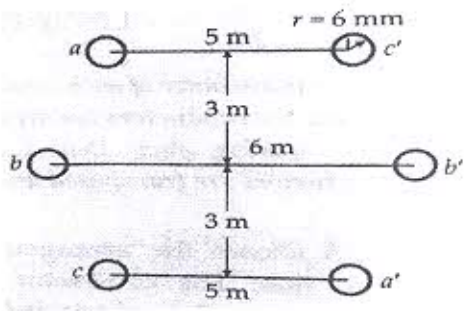
A. Attempt **all** parts. **(5x2 = 10)**

1. State the effect of electrostatic and electromagnetic effect on communication line.
2. Why receiving end voltage appears high compared to sending end voltage in case of lightly loaded transmission lines?
3. What is the need of transposition of transmission line?
4. What are the methods used for equalizing the potential across the insulator string in transmission lines?
5. What do you understand by the "Characteristic impedance" and "propagation constant" in long transmission lines?

Section-B

B. Attempt **all** parts. **(5x5 = 25)**

6. Derive the expression for inductance of a 3 phase unsymmetrical spaced transposed transmission line.
7. Find the inductance per phase per kilometer of double circuit 3 phase line shown in figure. The line is completely transposed and operates at a frequency of 50 Hz.



8. Explain the phenomenon of corona and factors affecting corona.

9. Determine the disruptive critical voltage and the visual critical voltages for general corona on a 3-phase overhead transmission line consisting of three stranded copper conductors spaced 2.44 m apart at the corner of an equilateral triangle. Air temperature and pressure are 21^0 C and 73.5cm of mercury respectively. Conductor diameter is 1.04 c.m. Irregularity factor 0.85 and surface factors for general corona is 0.7, breakdown strength of air is 21.1 kV (r.m.s)/cm.

10. Derive A, B, C, D constants of a medium length transmission line and hence prove that AD-BC=1.

Section-C

C. Attempt **all** parts. **(2x7.5 = 15)**

11. A 3-phase, 50-Hz overhead transmission line 100 km long has the following constants:
Resistance/km/phase = 0.1 Ω
Inductive reactance/km/phase= 0.2 Ω
Capacitive susceptance /km/phase= $0.04 * 10^{-4}$ siemen
Determine (i) the sending end current (ii) sending end voltage (iii) sending end power factor and (iv) transmission efficiency when supplying a balanced load of 10,000 kW at 66 kV, P.f. 0.8 lagging . Using Nominal T method.

12. Each line of a 3-phase system is suspended by a string of 3 identical insulators of self-capacitance C farad. The shunt capacitance of connecting metal work of each insulator is 0.2 C to earth and 0.1 C to line. Calculate the string efficiency of the system if a guard ring increases the capacitance to the line of metal work of the lowest insulator to 0.3 C.