1019

Bachelor of Engineering (Electrical and Electronics Engg.)
4th Semester
EE – 403: Power Systems - I

Time allowed: 3 Hours   Max. Marks: 50

Note: Attempt _five_ questions in all, including Question No. I which is compulsory and selecting two questions each from Unit I - II.

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I.   Answer the following questions:-

   a)   What are the factors which affect η of T/m line?
   b)   What is a surge?
   c)   Why power factor of cables is better than conductors?
   d)   How next high voltage level is selected?
   e)   What are ACSR conductors?   (5×2)

UNIT – I

II.   a)   What is charging current? How capacitances are calculated in 3-core belted cables?

   b)   The self capacitance of each unit is a string of four suspension units is C. The shunting capacitance of the connecting metal work of each insulator to earth is 0.25 C, while for the line it is 0.15 C. Find the %age voltage distribution and string η.   (5,5)

III.   a)   Write a brief note on vibration of conductors. How is the vibration minimized?

   b)   Discuss construction of various types of underground cables on the basis of voltage applications.   (5,5)

IV.   a)   What is grading of insulators? How it is achieved?

   b)   In a 3-Q, 3 core metal sheathed cable the measured capacitance between any two cores is 2 μF. Calculate the charging current and KVA taken by the cable when it is connected to 11 KV, 50 Hz supply.   (5,5)

UNIT – II

V.   a)   Derive an expression for loop inductance of a conductor.

   b)   A 3-Q double circuit has six conductors located at the corners of a regular hexagon of side 3m. Each conductor has a dia of 31.77 mm. The line is completely transposed. Find the capacitive reactance to neutral/km of the line.   (5,5)

VI.   a)   Describe wave equations for a surge travelling on a T/m line.

   b)   Two stations are connected together by an undergrounded cable having a capacitance of 1.15 μF/km and an inductance of 2MH/km. If a surge having a steady value of 100 KV travels along the cable towards a junction with an overhead line. Determine the values of reflected and transmitted waves of voltage and current at the junction.   (5,5)

VII.   A 3-Q T/m line has the following line parameters:-

   $A=D=0.96 \angle 2°$, $B=55 \angle 65°$, in ohms/phase, $C = 0.00005 \angle 80°$, s/phase.

   Determine sending end voltage and Pf when the line supplies a load of 45 MW at 132 Kv and 0.8 Pf lagging.   (10)