Registration No. :

Total number of printed pages – 2

Sixth Semester Back Examination – 2015

TRANSMISSION AND DISTRIBUTION SYSTEM

BRANCH : ELECTRICAL

QUESTION CODE : M 238

Full Marks – 70

Time : 3 Hours

Answer Question No. 1 which is compulsory and any five from the rest.
The figures in the right-hand margin indicate marks.

1. Answer the following questions :   2×10

   (a) What are the secondary constants of a line ? Why the line parameters are called distributed elements ?

   (b) State why transposition of line conductors are needed.

   (c) State advantages of ACSR conductors when used for overhead lines.

   (d) What are the factors which govern the performance of a transmission line ?

   (e) What is a finite line ? Write down the significance of this line.

   (f) Write down the expression for insulation resistance of a single core cable.

   (g) Name the factor that should be taken care of while designing and erecting a sub-stations.

   (h) What are the factors to be considered for busbar design ?

   (i) List the two merits of HVDC system.

   (j) State the advantages of double circuit line over single circuit line.

2. (a) Explain the effect of high voltage on volume of copper and on efficiency. 5

   (b) What is Ferranti effect? Explain with phasor diagram.   5

3. Determine the corona characteristics of a 3-phase line 160 km long conductor diameter 1.036 cm, 2.44 m delta spacing, air temperature 26.67°, altitude 2440 m, corresponding to an approximate barometric pressure of 73.15 cm, operating voltage 110 kV at 50 Hz.   10

4. (a) A 50 km long transmission line supplies a load of 5 MVA at 0.8 pf at 33 kV. The efficiency of the transmission line 90%. Calculate the volume of Al conductor required for the line when 3-phase, 3 wire system used. The specific resistance of Al is 2.85×10^{-8} ohm-m.   6

    (b) Draw the schematic diagram of a pin type insulator and explain its function.   4

5. (a) A string of 4 insulator units has a self capacitance equal to 4 times the pin to earth capacitance. Calculate :   5

    (i) Voltage distribution as a % of total voltage

    (ii) String efficiency.

    (b) Derive the expression for sag and tension when the supports are at unequal heights.   5

6. (a) Three single core lead sheathed cables carry three-phase currents of 400 A. The nominal conductor area of the cores is 1.25 sq. cm, the sheath thickness is 0.152 cm and the diameter over the sheath is 2.28 cms. They are supported in equilateral formation with a distance between cable centers of 5.08 cms. Calculate the induced emf in each sheath when the cable is 2 km long and supply frequency is 50 Hz.   5

    (b) What is arcing ground ? Explain its effect on the performance of a power system.   5

7. (a) What are the AC transmission and distribution level voltages we have in India ?   5

    (b) A 50 Hz transmission line 300 km long total series impedance of $40+j25\,\Omega$ and total shunt admittance of 10 mho. The 220 kV with 0.8 lagging power factor. Find the sending end voltage, current, power and power factor using nominal π method.   5

8. Write short notes any **two** of the following :   5×2

    (a) Grounding grids

    (b) Ring main distribution

    (c) HVDC transmission

    (d) Skin effect.