Code No: 07A50202 **R07** **Set No. 2**

III B.Tech I Semester Examinations,November 2010
POWER SYSTEMS-II
Electrical And Electronics Engineering

Time: 3 hours Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
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1. A surge of 120 KV travels on a line of surge impedance 450Ω and reaches the junction of the line with two branch lines. The surge impedance of branch lines are 400Ω and 40Ω. Find the transmitted voltage and currents. [16]

2. (a) What do you understand by long transmission lines? How capacitance effects are taken into account in such lines?
   (b) What is the justification in neglecting line capacitance in short transmission lines?
   [8+8]

3. A 1- core lead sheath cable joint has a conductor of diameter 8 mm and two layers of different insulating materials each 8 mm thick. The relative permittivity are ε_{r1} =3(inner) ε_{r2} =2.5(outer).Calculate the potential gradient at surface of the conductor when are p.d. Between the conductor and lead sheath is 50 kv. [16]

4. Determine the corona characteristics of a 3-phase, 50 Hz, 130 kv transmission line 100 km long running through terrain at an altitude of 600 meters, temp of 30^0C and barometric pressure 73 cm. The conductors are 1.5 cm diameter and spaced with equilateral spacing of 2.75 meters. Assume surface irregularity factor of 0.9 and m_y=0.75. [16]

5. A surge of 200 KV traveling on a line of surge impedance 400Ω reaches a junction of the line with two branch lines of surge impedance 600Ω and 400Ω respectively. Find the surge voltage and current transmitted into each branch line. Also find the reflected surge voltage and current. [16]

6. A string of 5 insulators has self-capacitance equal to 5 times the pin to earth capacitance. calculate
   (a) the voltage distribution across various units as a percentage of total voltage across the string and
   (b) string efficiency. [8+8]

7. Determine the inductance per km of a 3-phase transmission line having conductors per phase and arranged as shown in figure 1 [16]

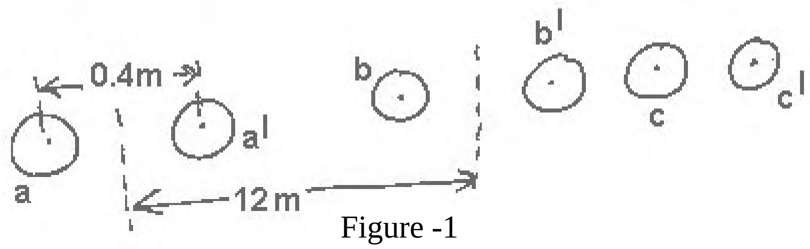

Figure -1

8. A transmission line has a span of 200m between level supports. The cross sectional area of the conductor is1.29cm^2 weighs 1170Kg/Km and has breaking stress of 4218Kg/cm^2. Calculate the sag for a factor of safety of 5, allowing wind pressure of 122 Kg per square meter of projected area. What is the vertical sag? [16]

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Code No: 07A50202 **R07** **Set No. 4**

III B.Tech I Semester Examinations,November 2010
POWER SYSTEMS-II
Electrical And Electronics Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Explain the variation of current and voltage on an overhead line when one end of the line is
   (a) short circuited and
   (b) open circuited and at the other end a source of constant emf V is switched in [16]

2. A transmission line has a span of 250m between the level supports. The cross sectional area of the conductor is 1.29 cm^2. The ultimate strength is 4220 kg/cm^2 and the factor of safety is 2. If the wind pressure is 40 Kg/cm^2. Calculate the height of the conductor above ground level at which it should be supported if a minimum clearance of 7m is to be kept between the ground and the conductor.[16]

3. (a) What is meant by capacitance grading of a cable ?
   (b) Derive expressions for capacitance of maximum potential gradient in two (or more) dielectric of a graded cable in terms of a dielectric constants and radius of core and overall radius etc. [8+8]

4. A string of 4 insulators has self-capacitance equal to 5 times pin to earth capacitance. Calculate
   (a) the voltage distribution across various units as a percentage of total voltage across the string and
   (b) string efficiency. [16]

5. Derive the expressions for the ABCD constants for a lossless long transmission line. Assume distributed parameters for the line. [16]

6. (a) What are the factors which effect corona?
   (b) A single phase transmission line has conductors of diameter 1.25 cm and spaced 2.5 meters apart. Derive an expression for the potential gradient at any point on a line joining the centre of the conductors if the operating voltage of line is 60 kv. Calculate the voltage at which corona will start. [8+8]

7. A 3-phase single circuit transmission line is 400 km long. If the line is rated for 220 KV and has the parameters R = 0.1 ohm/km, L = 1.26 mH/km, C = 0.009μF/km and G = 0, find
   (a) the surge impedance and

(b) the velocity of propagation neglecting the resistance of the line. If a surge of 150 KV and infinitely long tail strikes at one end of the line, what is the time taken for the surge to travel to the other end of the line? [16]

8. Derive an expression for the capacitance per meter length between two long parallel conductors, each of radius r, with axes separated by a distance D, where D>>r, the insulating medium being air. Calculate the maximum potential difference permissible between the conductors if the electric field strength between them is not exceed 25 KV/cm, r being 0.3 cm and D = 35 cm. [16]

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Code No: 07A50202 **R07** **Set No. 1**

III B.Tech I Semester Examinations,November 2010
POWER SYSTEMS-II
Electrical And Electronics Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. The three bus bar conductors in an outdoor sub-station are supplied by units of post insulators. Each unit consists of stack of 3-pin insulators fixed one on the top of the other. The voltage across the lowest insulator is 8.45kv and that across the next is 7.25Kv.Find the bus-bar voltage of the station? [16]

2. Derive an expression for the inductance per phase for a 3-phase over head transmission line
   (a) Conductors are symmetrically placed
   (b) Conductors are unsymmetrically placed but the lines is completely transposed. [16]

3. (a) Show that in a capacitance graded cable the position of different layers is decided by the product ε_r g Where ε is the relative permittivity of the dielectric and g is the dielectric strength (potential gradient) and that for a cable with overall radius R having (say) 3 dielectrics with all dielectrics working at the same maximum potential gradient ε_{r1} r = ε_{r2}
   r_1= ε_{r3} r_2 where r, r_1, r_2 are the radii of conductor, inner and middle dielectric spectively.
   (b) Write a short note on single core cable with a neat diagram? [8+8]

4. A 400 m long cable is short circuited at the remote end. A pulse source having resistance of 150 Ω drives a 100 V pulse, having duration of 6μs. If the characteristic resistance of the cable is 50 Ω and the pulse velocity is 200m/μs, sketch the voltage profile for first 8μs at the input of the line. [16]

5. Evaluate the generalized circuit constants for
   (a) Short transmission line
   (b) Medium line nominal T method
   (c) Medium line nominal π method. [16]

6. A long overhead line has surge impedance of 500Ω and effective resistance of 6Ω per km. If a surge of 400 KV enters the line at certain point, calculate the magnitude of this surge after it has traversed 100 km and calculate the power loss and heat loss of the wave over this distance. Assume velocity of wave is 3 x 10^8 m/sec [16]

7. (a) Explain the advantages and disadvantages of corona?

(b) A three phase line has conductors 2cm in diameter spaced equilaterally 1m apart .If the dielectric strength of air is 33KV (max). Per cm. Find the disruptive critical voltage for the line .Take air density factor δ =0.952 and irregularity factor m_o=0.85? [8+8]

8. A transmission line has a span of 150m between level supports. The cross sectional area of the conductor is 2cm^2.The tension in the conductor is 2000Kg/ cm^2.and safety factor is 5. The specific gravity of the material is 9.9 gm/cm^3. If the wind pressure is 1.5Kg/m.Calculate the height of the conductor above the ground level at which it should be supported if a minimum clearance of 7m is to be left between the ground and the conductor. [16]

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Code No: 07A50202 **R07** **Set No. 3**

III B.Tech I Semester Examinations,November 2010
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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. A step wave of magnitude E travels on a line of surge impedance Za and reaches the end of the line where the line is terminated by a resistance R and inductance L in series. Find an expression for the current in the terminating impedance. [16]

2. (a) Write a short note on pressure cables
   (b) Calculate the insulation resistance for a 5 km length of a 1-core cable. Resistance of insulation (impregnated paper) is 5*1014 ohm-cm, insulation thickness is 1 cm and radius of conductor is 1.25 cm. [8+8]

3. Find the A, B, C, D parameters of a 3-phase, 80 km, 50 Hz transmission line with series impedance (0.15 + j0.78)Ω per km and a shunt admittance of j5.0 x 10^{-6} mho per km. [16]

4. Two towers of height 30 and 90 m respectively support a transmission line conductor at water crossing. The horizontal distance between the towers is 500m.If the tension in the conductor is 1600 kg. Find the minimum clearance of the conductor and water and clearance at a point mid-way between the supports. Weight of the conductor is 1.5 kg/m. Bases of the towers can be considered to be at water level. [16]

5. Show that the inductance per unit length of an over head line due to internal flux linkages is constant and is independent of size of conductor. [16]

6. (a) What are the factors which effect corona?
   (b) A 3-phase, 50 Hz, 132 kV transmission line consists of conductors of 1.17 cm dia and spaced equilaterally at a distance of 3 meters. The line conductors have smooth surface with value for m = 0.96. The barometric pressure is 72 cm of Hg and temperature. Determine the fair and four weather corona loss per km per phase. [8+8]

7. A string of 4 insulators is connected across a 285kV line. The self capacitance of each unit is equal to 5 times pin to earth capacitance. Calculate
   (a) the potential difference across each unit and string efficiency? [16]

8. A system consists of long line of surge impedance 400 Ω, a cable of length 300 m, surge impedance 50 Ω, a line of length 300 m, surge impedance 400 Ω, a cable of length 300 m, surge impedance 50 Ω and a long line of surge impedance 400 Ω.

The velocity of propagation of wave is 300 m/μsec in line and 150 m/μsec in cable. A step wave of 100 KV travels along one of the long lines. Draw the Bewley lattice diagram and plot voltage versus time at the junction of long line and cable for 10 μsec. [16]

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