Code No: R05310203 **R05** **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) Explain the zig- zag diagram.
   (b) An 100kV, 2μSec rectangular surge travels along the line terminated by an inductance of 1mH. Determine the voltage across the inductance and reflected voltage wave if the surge impedance of the line is 500 ohms. [6+10]

2. (a) Determine the capacitance of a three-phase double circuit line when conductors are placed flat vertical unsymmetrical spacing.
   (b) Three conductors of a 3-phase line are arranged at the corners of a triangle of sides 2m, 3.2m and 4m.The diameter of each conductor is 2.5cm, Calculate the inductance per km of the line. [8+8]

3. (a) With reference to long transmission line, give physical interpretation of the terms of characteristic impedance and propagation constant? What is meant by surge impedance?
   (b) A 3-phase transmission line has the following constants: Resistance/phase /km = 0.16Ω; Reactance /phase/km= 1.5×10 ohms. Calculate by rigorous method the sending end voltage and current when the line is delivering a load P = 20MW at 0.8 p.f lagging. The receiving end voltage is kept constant at 132 kV. [8+8]

4. A (medium) single phase transmission line 100km long has the following constants:
   Resistance/km = 0.25 ohm
   Reactance/km = 0.8 ohm
   Susceptance/km = 14×10^{-6} mho
   Receiving end line voltage = 66,000 V
   Assume that the total capacitance of the line is localized at the receiving end alone; determine
   (a) the sending end current
   (b) the sending end voltage
   (c) regulation and
   (d) supply power factor. The line is delivering 15000kW at 0.8 power factor lagging. Draw the vector diagram to illustrate your calculations. [4+4+4+4]

5. An overhead line has a conductor diameter of 1.6 cm and is erected across a span of 200 meters on level supports. The radial thickness of ice under severe conditions is 1.25 cm and the dead weight of the conductor is 0.7 kg per meter run. The ultimate

stress of the conductor is 7000 kg, the modulus of elasticity is 7.5×10^5 kg/cm^2 and its coefficient of linear expansion is $16.5 \times 10^{-6}/\ ^0C$. Assume a wind pressure of 39 kg/m^2 and ice covering at temperature of -5.0 ^0C as the worst conditions, the factor of safety of 2 being required under these conditions. The weight of ice is 913.5 kg/m^3. Find the sag in still air at the time of erection when temperature is 35^0C. [16]

6. (a) Describe the function of sheath in cables? How are sheath losses reduced in modern multi core cable?

   (b) An 85-kV, 1-core metal-sheathed cable is to be graded by means of a metallic intersheath such that the overall diameter of the cable is minimum. The insulating material can be worked at 55 kV per cm. Find the diameter of the intersheath and the voltage at which it must be maintained. Compare the conductor and outside diameters of this cable with those of an un-graded cable employing the same insulating material and working under the same conditions. [8+8]

7. (a) What do you mean by corona ? What are the demerits of corona? How do you improve them?

   (b) A three phase 220kV, 50Hz transmission line consists of 1cm radius conductors spaced 2.5m at the corners of an equilateral triangle. Find out the corona loss per km of the line. The temperature of weather is 22^0C and barometric pressure is 73cm. The irregularity factor is 0.96. [8+8]

8. (a) Explain what is meant by a string efficiency of a suspension insulator consists of 'n' number of units. What causes the efficiency to be less than 100 percent? Describe any one method of improving the same.

   (b) A string of four suspension insulators is to be graded to obtain uniform distribution of voltage across the string. If the capacitance to ground of each unit is 10% of the capacitance of the top unit, determine the capacitance of the remaining three units. [8+8]

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Code No: R05310203 **R05** **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. (a) Describe the function of sheath in cables? How are sheath losses reduced in modern multi core cable?

   (b) An 85-kV, 1-core metal-sheathed cable is to be graded by means of a metallic intersheath such that the overall diameter of the cable is minimum. The insulating material can be worked at 55 kV per cm. Find the diameter of the intersheath and the voltage at which it must be maintained. Compare the conductor and outside diameters of this cable with those of an un-graded cable employing the same insulating material and working under the same conditions. [8+8]

2. (a) Explain the zig- zag diagram.

   (b) An 100kV, 2μSec rectangular surge travels along the line terminated by an inductance of 1mH. Determine the voltage across the inductance and reflected voltage wave if the surge impedance of the line is 500 ohms. [6+10]

3. A (medium) single phase transmission line 100km long has the following constants:
   Resistance/km = 0.25 ohm
   Reactance/km = 0.8 ohm
   Susceptance/km = 14×10^{-6} mho
   Receiving end line voltage = 66,000 V
   Assume that the total capacitance of the line is localized at the receiving end alone; determine

   (a) the sending end current

   (b) the sending end voltage

   (c) regulation and

   (d) supply power factor. The line is delivering 15000kW at 0.8 power factor lagging. Draw the vector diagram to illustrate your calculations. [4+4+4+4]

4. (a) With reference to long transmission line, give physical interpretation of the terms of characteristic impedance and propagation constant? What is meant by surge impedance?

   (b) A 3-phase transmission line has the following constants: Resistance/phase /km = 0.16Ω; Reactance /phase/km= 1.5×10 mho. Calculate by rigorous method the sending end voltage and current when the line is delivering a load P = 20MW at 0.8 p.f lagging. The receiving end voltage is kept constant at 132 kV. [8+8]

5. An overhead line has a conductor diameter of 1.6 cm and is erected across a span of 200 meters on level supports. The radial thickness of ice under severe conditions is 1.25 cm and the dead weight of the conductor is 0.7 kg per meter run. The ultimate stress of the conductor is 7000 kg, the modulus of elasticity is 7.5×10^5 kg/cm^2 and its coefficient of linear expansion is $16.5 \times 10^{-6}/\ ^0C$. Assume a wind pressure of 39 kg/m^2 and ice covering at temperature of -5.0 ^0C as the worst conditions, the factor of safety of 2 being required under these conditions. The weight of ice is 913.5 kg/m^3. Find the sag in still air at the time of erection when temperature is 35^0C. [16]

6. (a) Explain what is meant by a string efficiency of a suspension insulator consists of 'n' number of units. What causes the efficiency to be less than 100 percent? Describe any one method of improving the same.

   (b) A string of four suspension insulators is to be graded to obtain uniform distribution of voltage across the string. If the capacitance to ground of each unit is 10% of the capacitance of the top unit, determine the capacitance of the remaining three units. [8+8]

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   (b) A three phase 220kV, 50Hz transmission line consists of 1cm radius conductors spaced 2.5m at the corners of an equilateral triangle. Find out the corona loss per km of the line. The temperature of weather is 22^0C and barometric pressure is 73cm. The irregularity factor is 0.96. [8+8]

8. (a) Determine the capacitance of a three-phase double circuit line when conductors are placed flat vertical unsymmetrical spacing.

   (b) Three conductors of a 3-phase line are arranged at the corners of a triangle of sides 2m, 3.2m and 4m.The diameter of each conductor is 2.5cm, Calculate the inductance per km of the line. [8+8]

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Code No: R05310203 **R05** **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
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   Assume that the total capacitance of the line is localized at the receiving end alone; determine
   (a) the sending end current
   (b) the sending end voltage
   (c) regulation and
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4. (a) What do you mean by corona ? What are the demerits of corona? How do you improve them?
   (b) A three phase 220kV, 50Hz transmission line consists of 1cm radius conductors spaced 2.5m at the corners of an equilateral triangle. Find out the corona loss per km of the line. The temperature of weather is 22^0C and barometric pressure is 73cm. The irregularity factor is 0.96. [8+8]

5. (a) Explain the zig- zag diagram.

   (b) An 100kV, 2μSec rectangular surge travels along the line terminated by an inductance of 1mH. Determine the voltage across the inductance and reflected voltage wave if the surge impedance of the line is 500 ohms. [6+10]

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8. (a) With reference to long transmission line, give physical interpretation of the terms of characteristic impedance and propagation constant? What is meant by surge impedance?

   (b) A 3-phase transmission line has the following constants: Resistance/phase /km = 0.16Ω; Reactance /phase/km= 1.5$\times$10 mho. Calculate by rigorous method the sending end voltage and current when the line is delivering a load P = 20MW at 0.8 p.f lagging. The receiving end voltage is kept constant at 132 kV. [8+8]

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Code No: R05310203 **R05** **Set No. 3**

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

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

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   Assume that the total capacitance of the line is localized at the receiving end alone; determine
   (a) the sending end current
   (b) the sending end voltage
   (c) regulation and
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P = 20MW at 0.8 p.f lagging. The receiving end voltage is kept constant at 132 kV. [8+8]

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