Code No: R05310203 **R05** **Set No. 2**

III B.Tech I Semester Examinations,December 2011
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) Develop an equivalent circuit for the analysis of the behavior of travelling waves at transition points on a transmission line.
   (b) The ends of two long transmission lines, A and C are connected by a cable B, km long. The surge impedances of A, B, C are 500, 70 and 600 ohms respectively. A rectangular voltage wave of 20 kV magnitude and of infinite length is initiated in A and travels to C. Determine the first and second voltages impressed on C. [8+8]

2. (a) What are the sources of vibrations in a transmission line? Explain the methods used to damp out these vibrations.
   (b) An over head line is erected across a span of 250 m on level supports the conductor has a diameter of 1.42 cms and has a dead weight of 1.09 kg/m. the line is subjected to wind pressure 37.8 kg. per square meter of the projected area. The radial thickness of ice is 1.25 cms. Calculate the sag:
      i. in an inclined direction
      ii. in a vertical direction.
      Assume a maximum working stress 1050kg/ square cm, one cubic cm of ice weight 913.5 kg. [8+8]

3. (a) Derive the expression for calculating the internal and external flux linkages for a conductor carrying current. And also derive the equation for the inductance of a single phase line.
   (b) Calculate the inductance per phase of a three-phase double circuit line if the conductors are spaced at the vertices of a hexagon of side 2 m each. The diameter of each conductor is 2.0 cm. [8+8]

4. (a) Derive a relation between the conductor radius and inside sheath radius of a single core cable so that the electric stress of the conductor surface may be minimum.
   (b) A cable has been insulated with two insulating materials having permittivity of 6 and 4 respectively. The inner and outer diameter of a cable is 3 cms and 7 cms. If the dielectric stress is 50 kV/cm and 30 kV/cm, calculate the radial thickness of each insulating layer and the safe working voltage of the cable. [8+8]

5. A 3-phase, 50Hz overhead transmission line 100km long has the following constants: Resistance/km/phase = 0.1 ohm

Inductive reactance/km/phase = 0.2 ohm
Capacitive susceptance /km/phase = 0.04×10^{-4} mho
Determine

(a) the sending end current

(b) sending end voltage

(c) transmission efficiency when supplying a balanced load of 10000 kW at 66kV, p.f. 0.8 lagging. Use nominal-T method. Draw the phasor diagram to illustrate your calculations. [16]

6. (a) Explain the various factors affecting corona loss.

(b) In a three phase overhead line, the conductors have each an overall diameter of 3.2 cm and are arranged in delta formation. Assuming a critical voltage of 280 kV between lines and an air density factor of 0.9. Find the minimum spacing between conductors allowable, assuming fair weather conditions and breakdown voltage of 21.21(rms) kV/cm for smooth conductors. [8+8]

7. (a) Prove that the impedance at any point of transmission line is proportional to the hyperbolic tangent of the position angle.

(b) A 400kV, 3-phase transmission line has an impedance per phase of (50+j100)ohms and an admittance of 0+j002mho. Using the convergent series method determine

i. the sending end voltage and

ii. the sending end current when the receiving end current is 150Amps at 0.8 p.f lagging. [6+10]

8. (a) Explain why the potential distribution is not, in general, uniform over the string in a suspension type of insulators.

(b) Each line of a three phase system is suspended by a string of 3 identical insulators of self capacitance C farad. The shunt capacitance of the connecting metal work of each insulator is 0.3C to earth and 0.2C to line.
Calculate the string efficiency of the system if the guard ring increases the capacitance to the line of the metal work of the lowest insulator to 0.35C. [8+8]

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Code No: R05310203 **R05** **Set No. 4**

III B.Tech I Semester Examinations,December 2011
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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   Determine
   (a) the sending end current
   (b) sending end voltage
   (c) transmission efficiency when supplying a balanced load of 10000 kW at 66kV, p.f. 0.8 lagging. Use nominal-T method. Draw the phasor diagram to illustrate your calculations. [16]

2. (a) Develop an equivalent circuit for the analysis of the behavior of travelling waves at transition points on a transmission line.
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   Calculate the string efficiency of the system if the guard ring increases the capacitance to the line of the metal work of the lowest insulator to 0.35C. [8+8]

5. (a) Derive the expression for calculating the internal and external flux linkages for a conductor carrying current. And also derive the equation for the inductance of a single phase line.

   (b) Calculate the inductance per phase of a three-phase double circuit line if the conductors are spaced at the vertices of a hexagon of side 2 m each. The diameter of each conductor is 2.0 cm. [8+8]

6. (a) Explain the various factors affecting corona loss.

   (b) In a three phase overhead line, the conductors have each an overall diameter of 3.2 cm and are arranged in delta formation. Assuming a critical voltage of 280 kV between lines and an air density factor of 0.9. Find the minimum spacing between conductors allowable, assuming fair weather conditions and breakdown voltage of 21.21(rms) kV/cm for smooth conductors. [8+8]

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      i. in an inclined direction

      ii. in a vertical direction.

      Assume a maximum working stress 1050kg/ square cm, one cubic cm of ice weight 913.5 kg. [8+8]

8. (a) Derive a relation between the conductor radius and inside sheath radius of a single core cable so that the electric stress of the conductor surface may be minimum.

   (b) A cable has been insulated with two insulating materials having permittivity of 6 and 4 respectively. The inner and outer diameter of a cable is 3 cms and 7 cms. If the dielectric stress is 50 kV/cm and 30 kV/cm, calculate the radial thickness of each insulating layer and the safe working voltage of the cable. [8+8]

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Code No: R05310203 **R05** **Set No. 1**

III B.Tech I Semester Examinations,December 2011
POWER SYSTEMS-II
Electrical And Electronics Engineering

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

Answer any FIVE Questions
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   Calculate the string efficiency of the system if the guard ring increases the capacitance to the line of the metal work of the lowest insulator to 0.35C. [8+8]

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   (b) In a three phase overhead line, the conductors have each an overall diameter of 3.2 cm and are arranged in delta formation. Assuming a critical voltage of 280 kV between lines and an air density factor of 0.9. Find the minimum spacing between conductors allowable, assuming fair weather conditions and breakdown voltage of 21.21(rms) kV/cm for smooth conductors. [8+8]

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

III B.Tech I Semester Examinations,December 2011
POWER SYSTEMS-II
Electrical And Electronics Engineering

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

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