

**B.TECH.  
THEORY EXAMINATION (SEM-IV) 2016-17  
ELEMENTS OF POWER SYSTEM**

**Time : 3 Hours**

**Max. Marks : 100**

**Note : Be precise in your answer. In case of numerical problem assume data wherever not provided.**

**SECTION – A**

- 1. Explain the following:** **10 x 2 = 20**
- What is proximity effect?
  - What is the need of transposition of transmission lines?
  - What is the need of grounding the neutral in power system?
  - Write the name of different types of conductors in power system.
  - Define the critical disruptive voltage.
  - What is the limitation of kelvin's law?
  - What is the difference between isolator and circuit breaker?
  - Where do we use grounding transformer?
  - Discuss the problem associated with EHVAC transmission.
  - Explain the utilities of "Bundled conductors in Power System?"

**SECTION – B**

- 2. Attempt any five of the following questions:** **5 x 10 = 50**
- What are the factors which are responsible for the presence of skin effect in AC. Transmission? Discuss and suggest some measures to reduce it.
  - Derive A, B, C and D parameters for nominal  $\pi$  model of a medium line and draw its phasor diagram.
  - An overhead line having a conductor of diameter 10mm and a span length of 150 meters has sag of 3.5 meters at  $-5^{\circ}\text{C}$  with 10 mm thick ice coating and a wind pressure of  $40\text{ kg/m}^2$  of projected area.  $E = 1.27 \times 10^6\text{ kg/cm}^2$ ,  $\alpha = 16.6 \times 10^{-6}/^{\circ}\text{C}$ , ice density  $910\text{ kg/m}^3$  copper density  $8850\text{ kg/m}^3$ . Determine the temperature at which the sag will remain the same under fair weather condition.
  - Draw and explain single line diagram of power system.
  - A string of six insulator units has mutual capacitance 10 times the capacitance to ground. Determine the voltage across each unit as a fraction of the operating voltage. Also determine the string efficiency?
  - What are the basic needs of HVDC transmission over EHV AC? Also discuss the advantages and disadvantages of HVDC transmission system. What are the limitations of EHV AC transmission systems?
  - Explain the phenomenon of corona and factors affecting corona.
  - Explain the "surge impedance loading" in power system.
    - List the advantage and disadvantage of neutral grounding.

**SECTION – C**

**Attempt any two of the following questions:** **2 x 15 = 30**

- Derive expressions for calculating the economic voltage and economic conductor cross section of a line. Comment on the results.
- Write a short note on:**
  - Kelvin's law
  - Effect of wind and ice loading on mechanical design of a line.
- Explain the factors, which are considered during designing a transmission line? Also explain how ground wire selection is done.