

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**

- (a) What is proximity effect?
- (b) What is the need of transposition of transmission lines?
- (c) What is the need of grounding the neutral in power system?
- (d) Write the name of different types of conductors in power system.
- (e) Define the critical disruptive voltage.
- (f) What is the limitation of kelvin's law?
- (g) What is the difference between isolator and circuit breaker?
- (h) Where do we use grounding transformer?
- (i) Discuss the problem associated with EHVAC transmission.
- (j) Explain the utilities of "Bundled conductors in Power System?"

SECTION – B

2. Attempt any five of the following questions:**5 x 10 = 50**

- (a) What are the factors which are responsible for the presence of skin effect in AC. Transmission? Discuss and suggest some measures to reduce it.
- (b) Derive A, B, C and D parameters for nominal π model of a medium line and draw its phasor diagram.
- (c) An overhead line having a conductor of diameter 10mm and a span length of 150 meters has sag of 3.5 meters at -5°C with 10 mm thick ice coating and a wind pressure of 40 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 kg/m^3 copper density 8850 kg/m^3 . Determine the temperature at which the sag will remain the same under fair weather condition.
- (d) Draw and explain single line diagram of power system.
- (e) 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?
- (f) 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?
- (g) Explain the phenomenon of corona and factors affecting corona.
- (h) (i) Explain the "surge impedance loading" in power system.
(ii) List the advantage and disadvantage of neutral grounding.

SECTION – C

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

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