

B TECH
(SEM V) THEORY EXAMINATION 2017-18
ELEMENTS OF POWER SYSTEM

Time: 3 Hours**Total Marks: 100****Notes:** Attempt all Sections. Assume any missing data.

SECTION -A

1. Attempt all question in brief: (2x10=20)
- How does isolator differ from circuit breaker?
 - What is single line diagram of power system?
 - What are the components of transmission line?
 - What is transposition of transmission line?
 - Write advantages of bundled conductor.
 - Define the term Corona.
 - What is the failure of insulators?
 - Define Sag in transmission line.
 - What is general construction of cable?
 - What are the advantages of neutral grounding?

SECTION -B

2. Attempt any **three** parts of the following: (10x3=30)
- Find the ratio of volume of copper required to transmit a given power over a given distance by overhead system using (i) DC two wire system (ii) 3-phase 4-wire system.
 - Derive A, B, C and D parameters for nominal π model of a medium transmission line and draw its Phasor diagram.
 - Explain the phenomenon of corona formation and factors affecting, reducing corona. What is visual critical voltage?
 - Why do you the vibrations get generated in conductors? How are they damped? Explain effect of wind and ice loading on the mechanical design of a line.
 - What are advantages of HV DC transmission? Discuss various types of HVDC links.

SECTION -C

3. Attempt any **one** parts of the following: (10x1=10)
- State and explain Kelyin's law for economic size of conductor. Discuss limitations. Show how Skin effect increases effective resistance of the conductor.
 - Determine the best current density in amperes/mm² for a three phase overhead line. The line is in use for 3600 hours per year and if the conductor costs Rs. 3.0 / kg. It has a specific resistance of $1.73 \times 10^{-8} \Omega\text{-m}$ and weighs 6200 kg / m³. cost of energy is 12 paise / unit. Interest and depreciation is 10 % of conductor cost.
4. Attempt any **one** parts of the following: (10x1=10)
- Derive an expression for the capacitance of a single phase overhead transmission line. What do you mean by self G.M.D. and mutual G.M.D.
 - A two conductor, single phase line operates at 60 Hz. The diameter of each conductor is 5 cm and is spaced 3 m apart: calculate (i) the capacitance of each conductor to neutral per Km (ii) line to line capacitance (iii) capacitive susceptance to neutral per km.

5. Attempt any **one** parts of the following: (10x1=10)
- a) Describe pin type, suspension type, and strain type insulators with net sketch.
 - b) Explain the methods of equalizing the potential across the string insulator. And define string efficiency.
6. Attempt any **one** parts of the following: (10x1=10)
- a) Explain catenary method for the calculation of sag and tension in transmission line.
An overhead line has a span of 200 metres, the line conductor weighs 0.7 kg per meter. Calculate the maximum sag if allowable tension in the line is 1,400 kg. Prove formula used.
 - b) What is grading of cable? Why is it necessary? Explain Capacitance grading with suitable circuit Diagram.
7. Attempt any **one** parts of the following: (10x1=10)
- a) What are earthing and neutral grounding? Discuss different methods of neutral grounding with net sketch. Also give advantages.
 - b) Describe the various conductor configurations and choice of voltage, number of circuits for EHV Transmission lines. Make Economic comparison of EHV-AC & HVDC system.