



(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2057

Roll No.

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B.Tech**(SEM V) ODD SEMESTER THEORY EXAMINATION 2009-10
ELEMENTS OF POWER SYSTEM**

Time : 3 Hours]

[Total Marks : 100

Note : Attempt all questions.**1** Attempt any **four** of the following : **5×4=20**

- What do you understand by single line diagram of a power system ? What is the need of this diagram ?
- Justify the need of using an Isolator in addition to a circuit breaker ? How are they operated while breaking and while making a circuit ?
- Discuss about the factors affecting choice of transmission voltage level.
- Compare HVDC with HVAC transmission on at least 5 major grounds.
- Which material is used for overhead line conductor ? Discuss the reasons for selecting that material.
- Explain difference between skin effect and proximity effect.



2 Attempt any **two** of the following : $10 \times 2 = 20$

- (a) Starting from first principles, derive the expression for inductance of a 3 phase unsymmetrical spaced transposed transmission line.
- (b) Explain briefly about the following :
 - (i) GMD
 - (ii) Bundled conductors
 - (iii) Double circuit lines
 - (iv) Transposition
 - (v) SIL.
- (c) Derive the expression for sending end voltage and current in terms of receiving end voltage and current for long transmission lines. What do you understand by the "Characteristic Impedance" and "Propagation Constant" in it ?

3 Attempt any **two** of the following : $10 \times 2 = 20$

- (a) Write and explain the expression for power loss due to corona. What factors affect the corona loss ?
- (b) In a string insulator having 5 units, the self capacitance of insulator units is 6 times to that between a unit and earth. Obtain the potential distribution across each unit in the string as percentage of potential of conductor with respect to earth. Also find the string efficiency.
- (c) Describe about the following in brief :
 - (i) String insulators
 - (ii) Pin insulators
 - (iii) Strain insulators
 - (iv) Shackle insulators
 - (v) Methods of reducing corona.

4 Attempt any **four** of the following : $5 \times 4 = 20$

- (a) What is the use of a sag template ? Describe it in detail.
- (b) Derive the expression for sag when the conductor is supported by supports at equal height.
- (c) Why is capacitance grading required in cables ? How is it done ?
- (d) Discuss in brief about the types of cables.
- (e) Why do the vibrations get generated in conductors ? How are they damped ?
- (f) Derive the formula for insulation resistance of a cable. Calculate insulation resistance of 5 km length of single core cable whose insulation resistance is 5×10^{14} ohm. cm, insulation thickness is .1 cm and radius of conductor is 1.25 cm.

5 Attempt any **two** of the following : $10 \times 2 = 20$

- (a) What is the need of grounding the neutral ? Describe briefly the various grounding techniques.
- (b) Describe the various conductor configurations and choice of number of circuits for EHV transmission lines.
- (c) Answer the following :
 - (i) Resonant grounding
 - (ii) Relative merits and demerits of EHV transmission system.

