

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

PAPER ID : 2113

Roll No.

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B.Tech.

(SEM. V) THEORY EXAMINATION 2011-12

ELEMENTS OF POWER SYSTEM

Time : 3 Hours

Total Marks : 100

Note :—Attempt all questions.

1. Attempt any **two** of the following : **(10×2=20)**
 - (a) What are the principal components of an electric supply system ? Draw and explain a typical power supply network.
 - (b) Name and explain briefly the four parameters on which the performance of a transmission line depends. Also discuss the advantages and limitations of high transmission voltage.
 - (c) Distinguish between AC and DC resistances of a conductor. Why the two differ ? Derive an expression for internal flux linkage due to a single current carrying conductor.

2. Attempt any **two** of the following : **(10×2=20)**
 - (a) Give the concept of 'Self GMD'. Derive an expression for inductance of an unsymmetrical, transposed line using solid round conductors.

- (b) A single phase transmission line has two parallel conductors, each of 1.2 cm diameter and 2.5 meters apart. Calculate the loop inductance per km length of the line if the material of the conductor is steel with relative permeability of 200.
- (c) A long transmission line is open circuited at the receiving end. Will there be any current in the line at the sending end? Explain your answer.

3. Attempt any **two** of the following : **(10×2=20)**

- (a) What should be the desirable characteristics of insulating materials used in cables? Discuss the classification of cables according to voltage levels.
- (b) Derive an expression for sag and tension in a power conductor strung between two supports at equal heights taking into account the wind and ice loadings also.
- (c) Discuss the following methods of neutral grounding :
- Petersen coil grounding
 - Resistance grounding.

4. Attempt any **two** of the following : **(10×2=20)**

- (a) Define 'string efficiency'. Explain different methods of improving string efficiency.

- (b) A string of 5 insulators is connected across a 100 kV line. If the capacitance of each disc to earth is 0.1 of the capacitance of the insulator, calculate :

- the distribution of voltage on the insulator discs and
- the string efficiency.

- (c) A certain 3-phase equilateral transmission line has a total corona loss of 53 kW at 106 kV and a loss of 98 kW at 110.9 kV. What is the disruptive critical voltage? What will be the corona loss at 113 kV?

5. Attempt any **two** of the following : **(10×2=20)**

- (a) Give reasons for the following :

- A.C.S.R. conductors are preferred for transmission and distribution lines.
- Suspension insulators are preferred for high voltage power transmission.

- (b) Evaluate the generalized circuit constants for :

- short transmission line
- medium transmission line—nominal T method.

- (c) Write short notes on the following :

- Sag template
- Proximity effect
- Grading of cables
- Power system elements.