

- b) Derive an expression for sag in an overhead line conductor supported by the towers situated at different level. 7

Roll No

Unit - V

9. Short notes (any two):

- a) Explain Kelvin's law for most economical size of conductor. 7
- b) Ferranti effect. 7
- c) Compare a two wire D.C. transmission with three phase three wire transmission system. 7
- d) Explain corona and its advantages and disadvantages. 7

EX - 505**B.E. V Semester**

Examination, December 2013

Power System - I*Time : Three Hours**Maximum Marks : 70*

- Note:** 1. All questions carry equal marks.
2. Attempt One question from each unit.

Unit - I

1. a) Explain why Transmission voltage is generally kept in multiple of 11kV ie. 33kV, 66kV, 132kV. 7
- b) Define: 7
- i) Demand factor ii) Diversity factor
- iii) Utilization factor iv) Load factor

OR

2. a) Explain the effect transmission voltage on power system economy. 7
- b) A generating station supplies the following loads 15000kW, 12000kW, 8500kW, 6000kW and 450kW. The station has a maximum demand of 22000kW. The annual load factor of the station is 48%. Calculate
- i) The number of units supplied annually
- ii) The diversity factor
- iii) The demand factor 7

Unit - II

3. a) What do you mean by cable grading? Explain any one method. 7
- b) A single core lead sheathed cable joint has a conductor of 10mm diameter and two layers of different insulating materials each 10mm thick. The relative permittivities are 3 (inner) and 2.5 (outer) calculate the potential gradient at the surface of the conductor when the potential difference between the conductor and lead sheathing is 60kV. 7

OR

4. a) Derive the expressions for calculating the internal and external flux linkages of conductor carrying current. Hence deduce an expression for the total inductance of a 1 ϕ line. 7
- b) A two-conductor single phase line operates at 50Hz. The diameter of each conductor is 20mm and the spacing between the conductors is 3m. Calculate: 7
- Inductance of each conductor per km
 - The loop inductance of the line per km
 - The inductive reactance per km
 - The loop inductance per km of the line when the conductor material is steel of relative permeability 50.

Unit - III

5. a) Evaluate the generalised circuit constants A,B,C,D for medium line by nominal T method. 7
- b) A three phase 50Hz, transmission line 40km long delivers 36MW at 0.8 power factor lagging at 60kV (phase). The

line constants per conductor are $R = 2.5\Omega$, $L=0.1H$, $C = 0.25\mu F$. Shunt leakage may be neglected. Determine the voltage, current, power factor, active power and reactive volt amperes at the sending end. 7

OR

6. a) Discuss voltage control for Transmission system. 7
- b) Find the following for a single circuit transmission line delivering a load of 70MVA at 140kV and 0.85 p.f. lagging.
- Sending end voltage
 - Sending end current and power
 - Efficiency of transmission
- Give $A = D = 0.93\angle 3^\circ$, $B = 148\angle 70^\circ$ and $C = 0.0006\angle 81^\circ$ siemen. 7

Unit - IV

7. a) List different types of insulators used on overhead lines. Discuss their merits, demerits and application. Draw free hand sketch of pin type insulator. 7
- b) In a 33kV overhead line there are three units in the string of insulators. If the capacitance between each insulator pin and earth is 11% of self capacitance of each insulator, find: 7
- The distribution of voltage over 3 insulators.
 - String efficiency.

OR

8. a) Explain the construction and utility of stringing chart? 7