



Reg. No. :

Name :

**Fourth Semester B.Tech Degree Examination, July 2015
(2008 Scheme)**

08.406 : POWER SYSTEM ENGINEERING – I (E)

Time : 3 Hours

Max. Marks : 100

PART – A

Answer **all** questions : **(10x4=40 Marks)**

1. What is per unit system ? How are the base quantities selected ?
2. Derive the expression for capacitance between two single phase line.
3. What is equivalent spacing in three phase line ? What is its significance ?
4. A single phase transmission line has two conductors 2 meter apart. Radius of each conductor is 1 cm calculate the loop inductance of the line per km.
5. What is sag template ? How it is designed ?
6. Derive expression for sag in transmission line with unequal support.
7. What is string efficiency ? Explain any one method for improving string efficiency of overhead transmission line.
8. Write the significance of “diversity factor and load factor in power system”.
9. Write short notes on Tariff schemes in power distribution system.
10. Compare radial and ring min system for power distribution.



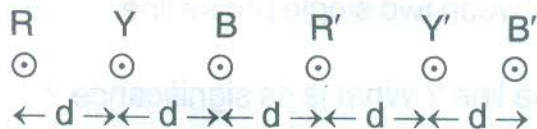
PART – B

Answer **one** question from **each** module. **Each** question carries **20** marks.

(20×3=60 Marks)

Module – I

11. a) Derive expression for inductance of three phase double circuit line with unsymmetrical spacing but transposed. 8
- b) Explain the effect of bundled conductors in three phase overhead transmission line. 6
- c) Write the effect of earth on transmission line capacitance. 6
12. a) A symmetrical three phase double circuit line is arranged in horizontal plane as shown. Assume balanced load equally distributed in two circuits, radius of each conductor is 'r'. Derive an expression for inductance. Find inductance per km per phase if $r = 0.8 \times 10^{-2} \text{m}$ and $d = 3\text{m}$.



- b) With phasor diagram derive expression for sending end voltage and current of medium transmission line by nominal π and T method. 10

Module – II

13. a) A 3 core 11 KV cable supplies a load of 1500 Kw at 0.8 pf lagging for 300 days in a year at an average of 8 hours per day. The capital cost per Km of the cable is Rs. 8,000 + 20000a. The resistance per Km of the cable of cross sectioned area 1cm^2 is 0.173Ω . If the energy loss cost is 2 paise per unit and the rate of interest and depreciation is 12% calculate the most economical current density and diameter of the conductor. 8
- b) Explain the methods of improving string efficiency. 5
- c) In a transmission line each conductor is at 20 KV and is supported by a string of three suspension insulators. The air capacitance between each cap-pin junction and tower is one fifth of the capacitance of each insulator unit. A Guard ring effective only over the line end insulator unit is fitted so that voltage on the two unit nearest the line end are equal.
- a) Calculate the voltage on the line end unit.
- b) Calculate the value of capacitance required. 7



14. a) Derive expression for capacitance of a single core cable. 8
- b) A 33 Kv three phase 2.5 Km long feeder uses single core cable having a conductor radius of 13 mm and an insulation thickness of 8.8 mm. The dielectric has a relative permittivity of 3.05 and the pf of the unloaded cable is 0.03. Find
- a) The capacitance per phase
 - b) Charging current
 - c) Total charging KVAR per phase and
 - d) Maximum dielectric stress on the cable. 12

Module – III

15. a) Explain in detail various Tariff schemes.
- b) A generating station has a maximum demand of 40 MW. Calculate 10
- a) The fixed cost.
 - b) The running cost
 - c) Number of units consumed per year and
 - d) The cost per Kwhr from the following data
- Capital cost = Rs. 140×10^6
Annual cost of fuel oil = Rs. 9×10^6
Taxes wages and salaries = Rs. 5×10^6
Interest and depreciation = 10%
Annual land factor = 50%. 10
16. a) Explain the methods of improving power factor in power system. What are the advantages of High power factor? 10
- b) A three phase synchronous motor having a mechanical load of 120 Kw is connected in parallel with a load of 500 Kw at 0.8 Pf lagging. The excitation of the motor is adjusted so that the KVA input to the motor becomes 140 KVA. Determine the new Pf of the whole system. 10
-