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Reg. No. : .....

Name : .....

Fourth Semester B.Tech. Degree Examination, February 2015
(2008 Scheme)
Branch : Electrical & Electronics
08.406 : POWER SYSTEM ENGINEERING – I (E)
(Special Supplementary)

Time : 3 Hours Max. Marks : 100

PART – A

Answer **all** questions. **(4×10 = 40 Marks)**

1. What is per unit value and how they are selected ?
2. What are the difficulties that may arise in an unsymmetrically spaced system and how they can be rectified in a 3 phase system ?
3. What are the advantages of bundled conductors over solid conductors ?
4. Draw the impedance diagram of a power system.
5. State Kelvin's law and what are its limitations ?
6. Prove that high voltage transmission reduces the cost of conductors.
7. Compare the volume of conductors needed in a 3 phase, 4 wire AC system with that of a 2 wire DC system.
8. Why arcing horn is used in conjunction with guard ring ?
9. Which is the proper location of power factor correction devices and why ?
10. What is ring main system and mention its advantages ?

P.T.O.

PART – B

Answer **one** question from **each** Module.

Module – I

11. a) A conductor consists of seven identical strands each having a radius 'r'. Determine the factor by which 'r' should be multiplied to find the self GMD of the conductor. 10

    b) A 3 phase, 50 Hz transmission line is 240 km long. The voltage at the sending end is 220 kV. The parameters of the line are R = 0.2 ohm/km, X = 0.8 ohm/km and Y = 5.3 μs/km. Find the sending end current when there is no load on the line. If the load on the line is 75 MW at 220 kV with unity power factor, calculate the current, voltage and power at the sending end. Assume that the sending end voltage is held constant. 10

OR

12. a) Derive the expression for sending end voltage and current of a medium transmission line, modelling it as nominal π. 10

    b) A 3 phase line operated at 50 Hz is arranged at the corners of a triangle of sides 2m, 3m and 2m. The conductor diameter is 0.6 cm. Find the inductance and capacitance per km. The line is regularly transposed. 10

Module – II

13. a) What is sag templates and how it is utilized in the erection of transmission lines. 10

    b) 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 1/5 of the capacitance of each insulator unit. A guard ring effective only over the line end insulator unit is fitted so that the voltages on the two units nearest the line end are equal. Calculate the voltage on the line end unit. Calculate the capacitance exists in between the line unit and the guard ring. 10

OR

14. a) Derive the Sag equation of a transmission line and how it is affected by wind and ice. 10

    b) A 3 phase 220 kV, 50 Hz transmission line consists of 1.2 cm radius conductors spaced 2 m at the corners of an equilateral triangle. Calculate the disruptive critical voltage between the lines. Irregularity factor is 0.96, temperature 20°C, barometric pressure 72 cm of mercury. Dielectric strength of air is 30 kV/cm. 10

Module – III

15. a) Describe the different tariff schemes used for the distribution of electrical energy. What are the merits and demerits of each scheme ? 12

    b) A generating station had a connected load of 43 MW and a maximum load of 20 MW. The units generated being 615×10^5 for the year. Calculate the load factor and demand factor for this case. 8

OR

16. a) Explain the power factor correction methods used in power systems and the relevance of each method. 10

    b) What should be value of diversity factor for a good system and explain how its value affect the cost of energy production ? 10