B.E. Fifth Semester (Elect. & Electronics Engg.) (CGS)

10381 : Electrical Power - I : 5 EX 04

P. Pages : 3 | AU - 2662

Time : Three Hours | Max. Marks : 80

* 0 5 8 7 *

Notes : 1. Answer **Three** question from Section A and **Three** question from Section B.
2. Due credit will be given to neatness and adequate dimensions.
3. Assume suitable data wherever necessary.
4. Diagrams and chemical equations should be given wherever necessary.
5. Illustrate your answer necessary with the help of neat sketches.
6. Use of pen Blue/Black ink/refill only for writing the answer book.

SECTION – A

1. a) Explain in detail the transmission line interference with communication line. **7**

b) Explain the skin effect and proximity effect in detail. **6**

OR

2. a) Explain the method of Geometric mean distance of calculate the inductance. **6**

b) Derive the expression for the capacitance of three phase symmetric line. **7**

3. a) using nominal π model, find the sending end voltage and voltage regulation of 250 km, 3-phase, 50 Hz transmission line delivering 25 MVA at 0.8 power factor lagging balance load at 132 kV. The line conductor are spaced equilaterally 3m apart. The conductor resistance is 0.11 Ω /km and its effective diameter is 1.6 cm. Neglect losses. **7**

b) Explain factor which affect the corona. **6**

OR

4. a) Determine efficiency & regulation of 3-ϕ, 150 km long, 50 Hz transmission line delivering 20 MW at a p.f. of 0.81 lagging and 66 kV to a balanced load. Resistance of line is 0.075 Ω/km, outside diameter is 1.5 cm, spaced equilaterally 2m between centers. Use nominal π method. **7**

b) Define per unit value. Explain the advantages of per unit system representation of a power system. **6**

5. a) Define power factor. What are the different method for power factor improvement? Explain any one in detail. **7**

b) A-3-ϕ, 300 km long, transmission line has R = 0.1 Ω/km, X = 0.4 Ω /km & **7**

$Y = 5\times10^{-6} < 90\frac{\upsilon}{KM}$. Draw receiving end and sending end circle diagram. Determine sending end voltage and current when the line is delivering a load of 200 MW at 0.8 p.f. lagging at 250 kV. Assume T-configuration.

OR

6. a) Draw the receiving end power circle diagram. Explain its construction. Derive an expression for maximum receiving power with sending end, receiving end voltage kept constant. 7

b) The generalised constants of 1- ϕ of 3-ϕ line are, 7

$A = D = 0.9 + j0.012$

$B = (22.5 + j150)\Omega$

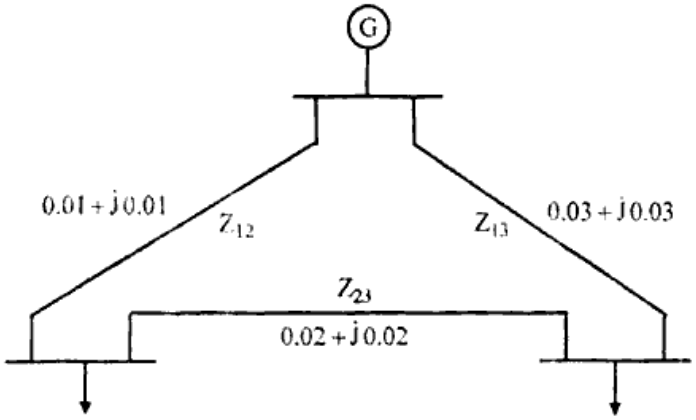
& $C = (-0.00004 + j0.001)S.$

The sending end voltage is 240 kV and receiving end voltage is 220 kV line to line. Draw the receiving end circle diagram and determine the active and reactive power received when the angle between the sending end and receiving end voltage is 30°.

SECTION – B

7. a) With the help of flow chart describe the load flow solution using Gauss Seidal method. 7

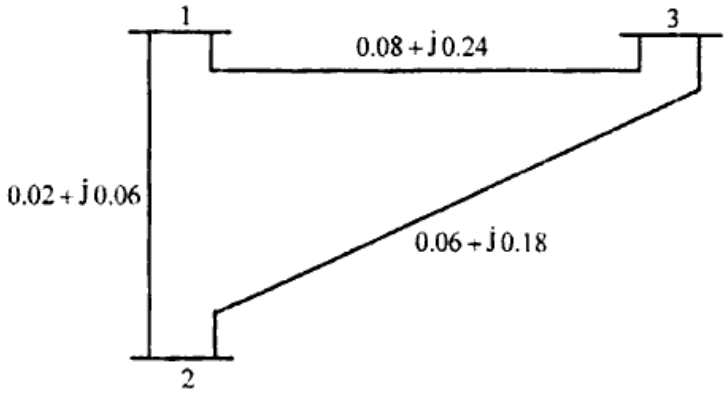
b) Find Y_{Bus} for 3-Bus system shown in figure below. The per unit impedance are shown on a diagram. Neglect shunt capacitance of line. 7



OR

8. a) Develop the equation for real and reactive power in an n-bus power system. 7

b) Find bus admittance matrix Y_{Bus} for the three bus system shown in figure below. The per unit impedances are shown on the system diagram. Neglect shunt capacitance of line. 7



9. a) Draw and explain various types of line support. 6

b) Explain the effect of wind and ice loading on sag of transmission line. 7

OR

10. a) For string of three disc of suspension type insulators, deduce the expression for voltage across each unit, hence define string efficiency. 6

b) A 132 kV, overhead transmission line has the following data, 7

Conductor diameter = 19.53 mm,
Weight of conductor = 844 kg/km,
Ultimate strength = 7950 kg,
Length of span = 300 m,
Safety factor = 2.

Calculate the height above the ground at which the conductor should be supported if the wind pressure is 75 kg/m^2 of the projected area. Ground clearance is 12 m.

11. a) What do you mean by grading of cables? What are the different methods of grading. Explain any one in detail. 6

b) A 33 kV, 3-ϕ underground cable 4 km long has 3 single core cables. Each of the conductor has diameter of 2.5 cm & radius thickness is 0.5 cm. The relative permittivity of dielectric is 3. 7

Determine

i) Capacitance of cable/phase.
ii) Total charging KVAR.

OR

12. a) State the advantages & disadvantages of overhead transmission lines and underground transmission systems. 7

b) What is void formation in cable? How it affects the performance of the cable? What steps are taken to prevent the formation of voids? 6

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