

Nov-Dec
2011



[4063] – 256

T.E. (Electrical) (Semester – II) Examination, 2011
POWER SYSTEM – II (New)
(2008 Pattern)

Time : 3 Hours

Max. Marks : 100

- Instructions :**
- 1) Answer **any 3** questions from **each** Section Unitwise.
 - 2) Answer **3** questions from Section **I** and **3** questions from Section **II** Unitwise.
 - 3) Answers to the **two** Sections should be written in **separate** books.
 - 4) **Neat** diagrams must be drawn **wherever** necessary.
 - 5) Black figures to the **right** indicate **full** marks.
 - 6) Your answers will be valued as a **whole**.
 - 7) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is **allowed**.

SECTION – I

1. a) Derive powerflow equation using generalised constants for transmission line. 8

- b) A long transmission line delivers a load of 60 MVA at 124 KV, 50 Hz, at 0.8 p.f. lagging. The constants at transmission line are $A = D = 0.986 \angle 0.32^\circ$, $B = 70.3 \angle 69.2^\circ \Omega$, $C = 4.44 \times 10^{-3} \angle 90^\circ \Omega$

Determine :

- i) Receiving end active power
- ii) Sending end voltage and current
- iii) Sending end active power
- iv) Line losses. 8

OR

P.T.O.



2. a) Explain procedure to draw receiving end circle diagram. What information can be obtained from power circle diagram ? 8
- b) Prove that apparent power $S = V \cdot I^*$. Hence explain concept of complex power. 8
3. a) Explain advantages and disadvantages of E.H.V A.C. transmission. 8
- b) A three phase, 220KV, 50 Hz transmission line consists of 1.2 cm radius of conductor spaced 2 m at corner of an equilateral triangle. Calculate disruptive critical voltage between the lines. Irregularity factor = 0.96, temperature = 20° , barometric pressure = 72.2 cm of Hg. Dielectric strength of air = 21.1 KV (rms)/cm. Hence calculate corona power loss. 8

OR

4. a) Explain phenomenon of corona. Also explain visual critical voltage of corona. 8
- b) A three phase, 220KV, 50 Hz transmission line consists of 1.2 cm radius of conductor spaced 2 m at corner of an equilateral triangle. Calculate disruptive critical voltage between the lines. Irregularity factor = 0.96, temperature = 20° , barometric pressure = 72.2 cm of Hg. Dielectric strength of air = 21.1 KV (rms)/cm. Hence calculate corona power loss. 8
5. a) A 100 MVA, 33 KV, three phase generator has a reactance of 15%. The generator is connected to three motors through transmission line and transformers as shown in fig. Motors have rated input of 40 MVA, 30 MVA, 20 MVA at 30 KV with 20% reactance each. Draw per unit diagram. Assume base 100 MVA, 33 KV on generator. 10

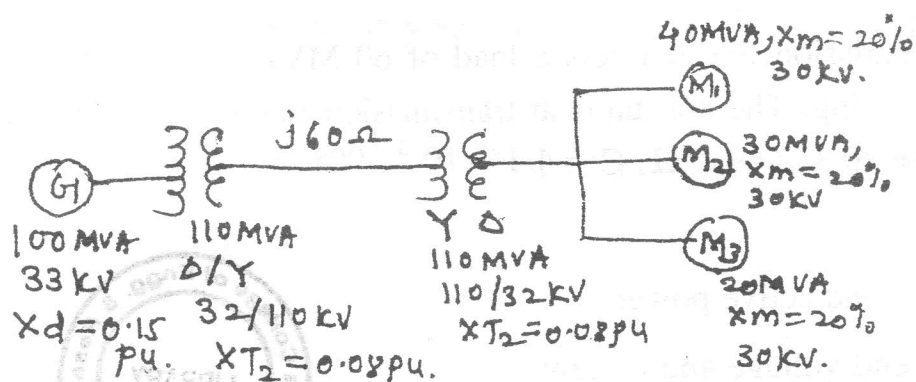


Fig 5(a)

- b) Write short note on current limiting reactor. 8

OR



6. a) Two generators G_1 and G_2 are rated 15 MVA, 11 KV and 10 MVA, 11 KV respectively. The generators are connected to a transformer as shown in fig. Calculate the subtransient current in each generator when three phase short circuit fault occurs on high voltage side of transformer. 10

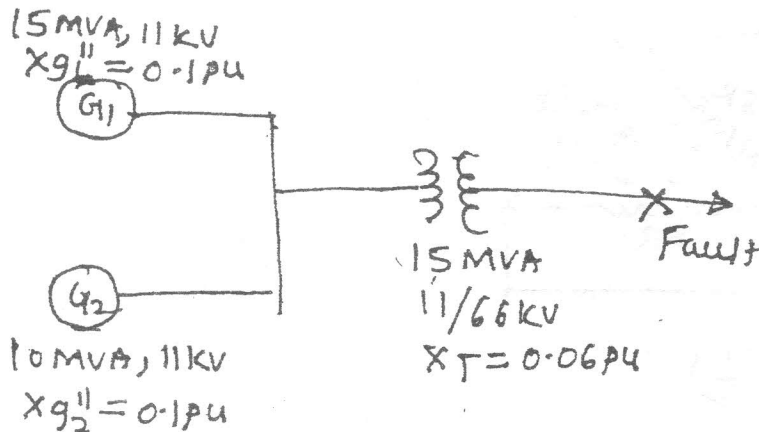


Fig 6 (a)

- b) Explain subtransient, transient and steady state current when sudden short circuit occurs at unloaded alternator terminals. 8

SECTION – II

7. a) Draw zero sequence diagram for all types of combinations of transformers. 8

- b) Show that fault current $I_f = \frac{3E}{Z_1 + Z_2 + Z_0}$ when L-G fault occurs at the terminals of solidly grounded star connected alternator. 10

OR



8. a) For a three phase transmission line with self impedance z_s and mutual impedance z_m , show that $z_1 = z_2 = z_s - z_m$ and $z_0 = z_s + 2z_m$. 6
- b) A delta connected load is connected across an unbalanced three phase supply as shown in fig. Find symmetrical components of all line currents and phase currents. 12

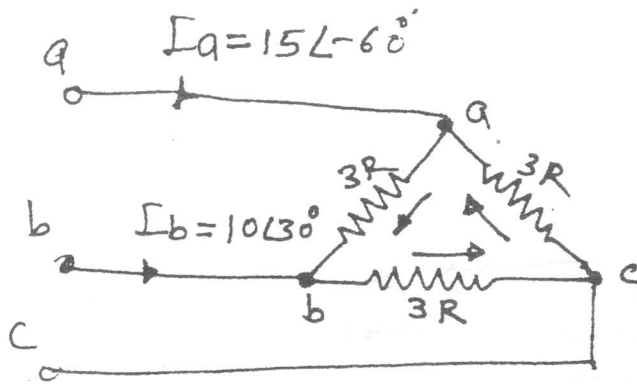


Fig 8 (b)

9. a) Derive static load flow equations for n bus system. 9
- b) Give the classification of bus for load flow analysis. 7

OR

10. a) Explain formulation of Y-bus using bus incidence matrix. 9
- b) Compare Newton Raphson with Gauss Seidal method of load flow analysis. 7
11. a) Give advantages and disadvantages of HVDC transmission system. 8
- b) Explain components of HVDC transmission system with single line diagram. 8

OR

12. Write short note on (any two) : 16
- i) Bipolar and mono-polar HVDC transmission system
 - ii) Constant current control
 - iii) Constant extinction control.