B.E.(with Credits)-Regular-Semester 2012 - Electrical Engineering & (E. & P.) Sem VI

EE604 - Electrical Power System-II

P. Pages : 3 **GUG/W/16/5364**

Time : Three Hours * 3 5 3 9 * Max. Marks : 80

Notes : 1. All questions carry equal marks.
2. Answer **five** questions as per option mentioned.
3. Assume suitable data wherever necessary.
4. Use of Non programmable calculator is permitted.

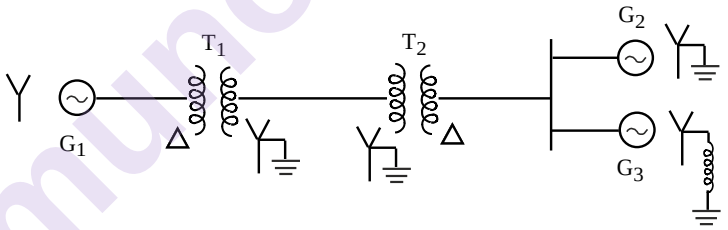
1. a) Derive the sequence impedance of 3-phase transmission line with self reactance of each phase as Xs & Mutal reactance between the phases as Xm & Also draw the sequence Network. **8**

b) A balanced Y-connected load takes 90Amp. from a balanced 3-phase 4 Wire supply. If the fuses in two of the supply line are removed. Find the symmetrical components of the line. **8**
i) Before the fuse are removed.
ii) After the fuse are removed.

OR

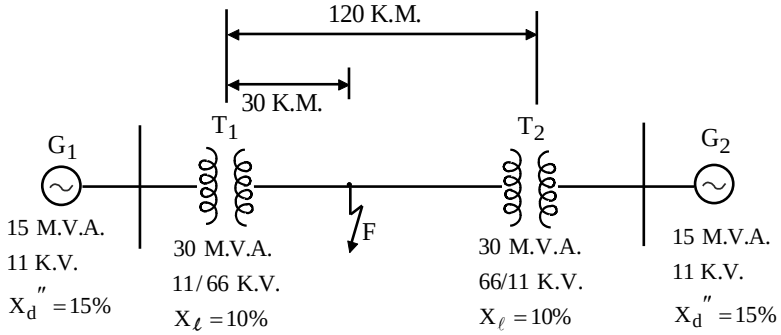
2. a) The line -line voltage of a 3-ϕ system are 50,75 & 100v. Find the symmetrical components of Delta voltage. What relation exit between the sequence components of Δ&Y voltages? & Also find the symmetrical components of Y-voltages. **13**

b) Draw the positive, Negative & zero sequence Network for the system shown in fig. **3**



3. a) Why do we use current limiting reactor in power system? How they are classified? **6**

b) Two generator's rated 15 M.V.A., 11 K.V. having 15% subtransient reactance are interconnected through transformer & a 120 K.M. long line as shown in fig. **10**
The Reactance of the line is 0.12 ohms/Km. The transformer near the generator are rated 30 M.V.A., 11/66 K.V. with Leakage reactance of 10% each. A symmetrical three-phase occurs at a distance of 30 K.M. from one end of the line. When the system is on-Load but at rated voltage. Determine the fault current & fault M.V.A.



4. a) Derive an expression for fault current for L-L fault with fault impedance Zf, by Symmetrical Component Method. Draw the Sequence Network. **7**

b) Two 25 M.V.A., 11 K.V. synchronous generator are connected to a common bus-bar which supplies a feeder. The star point of one generator is grounded through a resistance of 1Ω, while that of the other generator is isolated. A single line to ground fault occurs at the far end of the feeder as shown in fig. **9**

Determine.

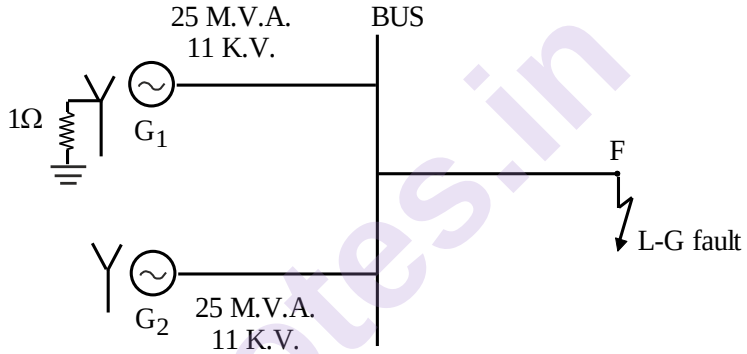
i) Fault current.

ii) Voltage to ground of sound phase of feeder at the fault point.

iii) Voltage of the star point of the grounded generator w.r. to ground.

Impedance to sequence current of each generator & feeder are given below:

	Generator (P.U.)	Feeder (Ω/ph)
Positive sequence	j0.2	j0.4
Negative sequence	j0.15	j0.4
Zero sequence	j0.08	j0.8



5. a) Derive the relationship between two intertia constants G & H of synchronous Machine. **6**

b) Differentiate the meaning of steady state stability, dynamic stability & transient stability referred to power system. **4**

c) A 50 cycle, 4-pole turbo-generator of rating 20 M.V.A., 13.2K.V. has intertia constant of H=9 kW Sec/K.V.A. Find the kinetic energy stored in the rotor at synchronous speed. Find the acceleration if the input loss the rotional losses is 26,800 H.P. & electric power developed is 16Kw. **6**

OR

6. a) Explain equal area criterion of stability applied to a finite machine connected to infinite bus. **7**

b) The transfer reactance between the generator & infinite bus bar operating at 200 K.V. under various condition on interconnector are. **9**

Pre-fault: 150 Ω/ph,

During fault : 400Ω/ph

Post fault : 200Ω/ph

If the fault is cleared when the rotor has advanced 60^{o} electrical from its pre fault position. Determine the maximum load that could be transferred without loss of stability.

7. a) Derive the co-ordination equation for economic scheduling including transmission losses. Give the algorithm for the solution of co-ordination equation & Draw the flow chart. **10**

b) The Incremental fuel cost of two plants are given by, **6**

$$\frac{df_1}{dp_1} = 0.1p_1 + 22 \text{ Rs/Mw.hr.}$$

&

$$\frac{df_2}{dp_2} = 0.12p_2 + 0.16 \text{Rs/Mw.hr.}$$

if both unit's operate at all time & maximum & minimum load on each unit are 100 MW & 20MW respectively

Determine the economic operating schedule of the plants for loads.

i) 40MW.

ii) 120MW.

Neglect the transmission losses. Find incremental fuel cost in each case.

OR

8. a) Explain the factor to be considered while distributing the loads between the generating plants. **6**

b) Write short note on: **4**

i) Incremental fuel cost

ii) Transmission loss formula.

c) Draw the block diagram for automatic load dispatch & Explain the same. **6**

9. a) Explain the resonance grounding system & How the earth fault current is completely suppressed? **8**

b) In 50 cycle/sec overhead line the capacitance of one line to earth is 1.5 μf. It is decided to use an earth fault neutralizer. calculate the reactance to neutralize the capacitance of **8**

i) 100% length of line.

ii) 50% length of line.

OR

10. a) Explain what is arcing ground. State the methods of a voiding arcing ground. **6**

b) Write short note on: **5**

i) Grounding through zig-zag transformers.

ii) Resistance grounding.

c) A 132 KV, 50Hz, Three phase, 100km long transmission line has a capacitance of 0.012 microfarad per km per phase. **5**

Determine MVA rating of the arc suppression coil suitable for the line to eliminate arcing ground phenomenon.

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