Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 91446

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2014.

Sixth Semester

Electrical and Electronics Engineering

EE 2351/EE 61/10133 EE 601 — POWER SYSTEM ANALYSIS

(Regulation 2008/2010)

(Common to PTEE 2351/10133 EE 601 Power System Analysis for B.E. (Part–Time) Fourth Semester Electrical and Electronics Engineering Regulation 2009/2010)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. What are the main divisions of power system?

2. What is the need for per unit value?

3. What is load flow or power flow study?

4. Define voltage controlled bus.

5. What is the need for short circuit study?

6. What is symmetrical fault?

7. What are symmetrical components?

8. What is sequence networks?

9. Define critical clearing time and critical clearing angle.

10. What is steady state stability limit?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain structure of modern power system with neat sketch. (8)

(ii) Describe about the representation of loads. (8)

Or

(b) (i) Obtain the per unit impedance diagram of the power system of fig shown below :

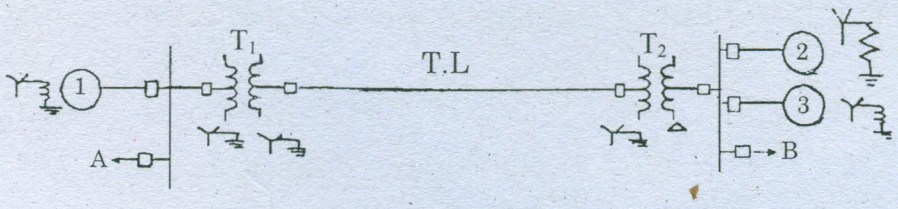


Fig one line diagram representation of a simple power system

Generator No 1:30 MVA, 10.5 Kv, $X'' = 1.6$ ohms

Generator No. 2:15 MVA, 6.6 Kv, $X'' = 1.2$ ohms

Generator No 3:25 MVA, 6.6 Kv, $X'' = 0.56$ ohms

Transformer T_1(3 phase): 15 MVA, 33/11 Kv, X = 15.2 ohms per phase on high tension side.

Transformer T_2(3 phase): 15 MVA, 33/6.2 Kv, X = 16 ohms per phase on high tension side.

Transmission line : 20.5 ohms/phase.

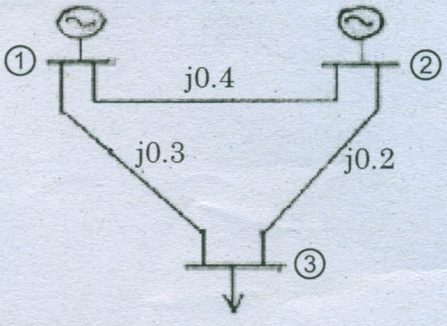
Load A: 15MW, 11 Kv, 0.9 lagging power factor.

Load B: 40MW, 6.6 Kv, 0.85 lagging power factor. (12)

(ii) Draw the per unit equivalent circuit of single — phase transformer? (4)

12. (a) (i) Write a note on classification of buses. (6)

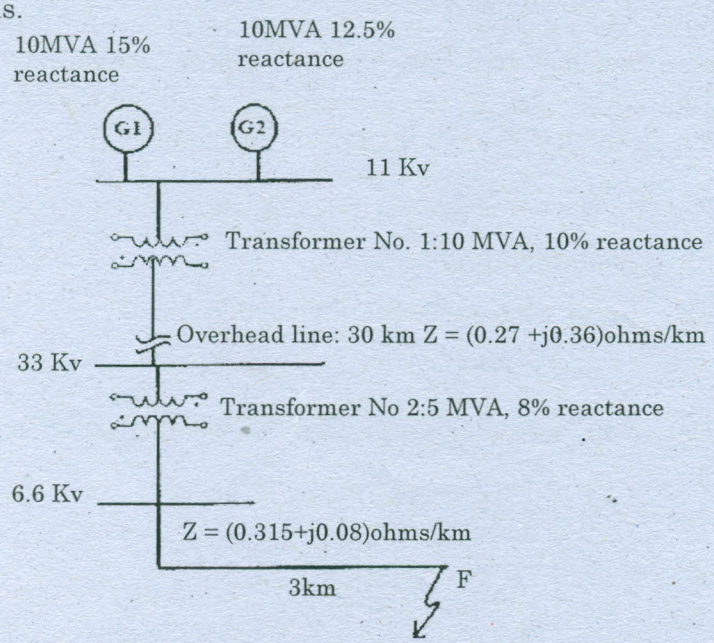
(ii) Fig shown below a three bus power system Bus.1: slack bus V= $1.05\angle 0°$ p.u, Bus 2: PV Bus $|V| = 1.0$ p.u, $P_g = 3$ p.u. Bus 3: PQ Bus. $P_L = 4$ p.u, $Q_L = 2$ p.u. carry out one iteration of load flow solution by Gauss Seidel method. Neglect limits on reactive power generation? (10)



Or

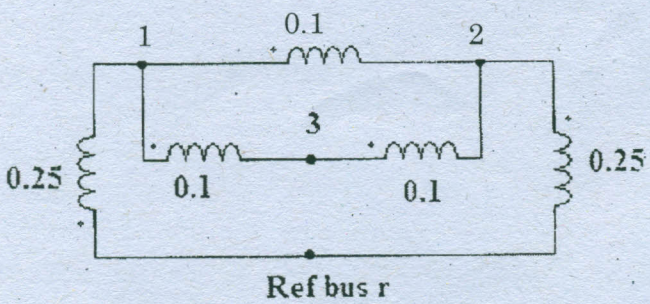
(b) Develop an algorithm and draw the flow chart for the solution of load flow problem using N-R method. (16)

13. (a) For the radial network shown below a three–phase fault occurs at F. Determine the fault current and the line voltage at 11kv bus under fault conditions.



Or

(b) For the 3–bus network fig shown below obtain Z bus by building algorithm.



14. (a) Explain about concept of symmetrical component. (16)

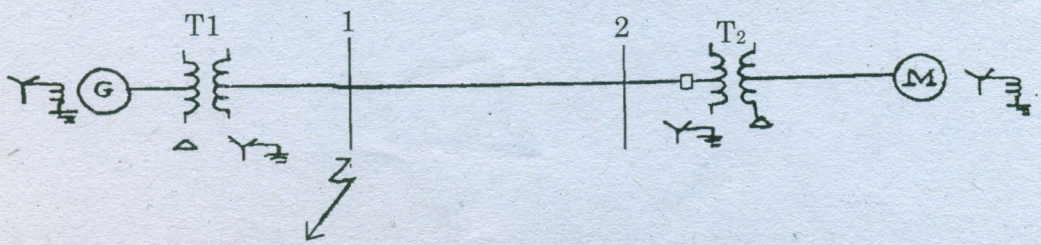
Or

(b) A single line to ground fault occurs on the bus 1 of the system of fig shown below find

(i) Current in the fault

(ii) SC current in phase a of generator

(iii) Voltage of the healthy phases of the bus 1 using Z_{Bus} method.



Given : Rating of the each machine 1200 KVA, 600V, with $X = X_2 = 10\%$, $X_0 = 5\%$ each three phase transformer is rated 1200 KVA, 600 – Δ/3300V – Y with leakage reactance of 5% the reactance of the transmission line are $X_1 = X_2 = 20\%$ and $X_0 = 40\%$ on a base of 1200 KVA, 3300V, the reactance's of the neutral grounding reactors are 5% on the KVA and voltage base of the machine. (16)

15. (a) Explain the equal area criteria for the following applications : (16)

(i) Sustained fault

(ii) Fault with subsequent clearing.

Or

(b) Derive the swing equation from the basic principles. Why it is non-linear? (16)