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Question Paper Code : 21509

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Sixth Semester

Electrical and Electronics Engineering

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

(Regulations 2008/2010)

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

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Draw the simplified model of a generator.
2. Distinguish between impedance and reactance diagram.
3. Write the static load flow equation
4. State the role of acceleration factor in GS method.
5. What is a bolted fault?
6. Define short circuit capacity
7. State Fortescue Theorem
8. Which type of fault is very common in power system?
9. How are power system stability classified?
10. Define critical clearing angle.

PART B — (5 × 16 = 80 marks)

11. (a) Explain how the following power system components are modeled in power system studies

(i) generators (ii) transmission lines and (iii) loads

Or

(b) Draw the reactance diagram for the power system shown in figure Q.11 (b). Take 100 MVA, 220KV in 50 ohms line as base value.

Gen	:	40MVA, 25KV, X"	= 20%
Mot	:	50MVA, 11KV, X"	= 30%
T1	:	40MVA,33/220KV,X	= 15%
T2	:	30MVA,11/220KV,X	= 15% (Delta/Star)

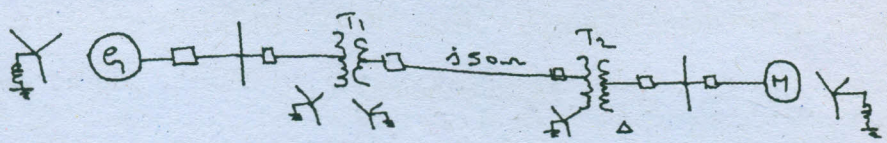

Fig Q. 11(b)

12. (a) Derive fast decoupled load flow algorithm and give the procedure for implementing this algorithm.

Or

(b) Fig Q. 12(b) Shows a three bus system.

Bus 1 : Slack bus, V= 1.05 $\angle 0°$ p.u

Bus 2: PV bus, IVI = 1.0 p.u, Pg = 3 p.u

Bus 3: PQ bus, P_L=4 p.u, Q_L=2 p.u

Carryout one iteration of load flow solution by Gauss seidal method.

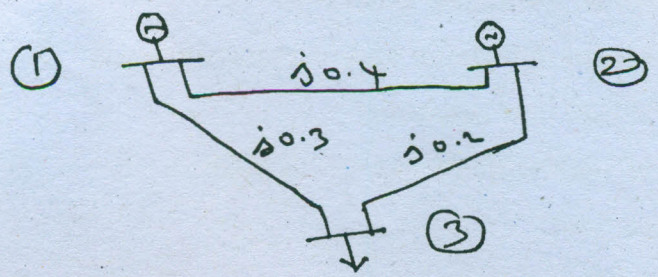

Fig Q. 12(b)

13. (a) A three phase, 5 MVA, 6.6 KV alternator with a reactance of 8% is connected to a feeder of series impedance of 0.12+j0.48 ohms / phase per KM. The transformer is rated at 3 MVA, 6.6 KV/33 KV has a reactance of 5 %. Determine the fault current supplied by the generator operating under no load with a voltage of 6.9 KV, when a three phase symmetrical fault occurs at a point 15 KM along the feeder.

Or

(b) Describe the bus impedance matrix method of fault current calculation.

14. (a) Derive an expression for fault current for a double line to ground fault on an unloaded synchronous machine. Also draw the interconnection of sequence networks.

Or

(b) The sequence components of currents in a system are $I_{a1} = 8.334 \angle -90^\circ$ $I_{a2} = 1.6668 \angle 90^\circ$ $I_{a0} = 6.6672 \angle 90^\circ$. Find I_a, I_b and I_c.

15. (a) Develop an algorithm and draw flow chart for the solutions of swing equations by modified Euler's method.

Or

(b) A large cylindrical rotor generator is delivering 1.0 p.u power to an infinite bus through a transmission network. The maximum power which can be transferred for pre fault, during fault and post fault conditions are 1.8 p.u, 0.4 p.u and 1.3 p.u. Find the critical clearing angle.
