

End Semester Examinations - 2015-16 Even Semester - May 2016

14EE2014 Power System Analysis

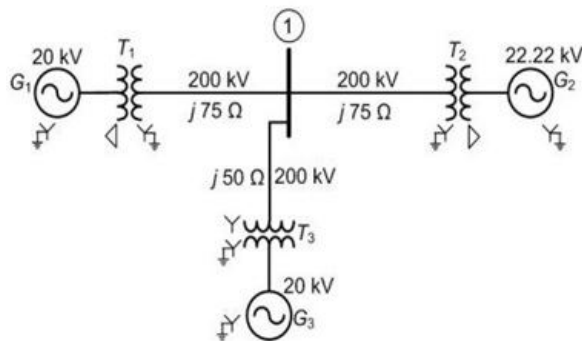
Set B

Time : 3 hrs
Total Marks: 100

1. (a) Discuss about the need of power system analysis, planning and operation (5)
- (b) Define Per unit representation and list out the significant of per unit representation (5)
- (c) Derive the Fault current expression for line to line fault occurs in a power system. (10)

OR

2. Consider the 50 Hz power system the single-line diagram of which is shown in Fig The system contains three generators, three transformers and three transmission lines. The system ratings are given below. The transmission line reactance are as indicated in the figure. Draw the reactance diagram choosing the Generator 3 as the base.



G ₁	200 MVA, 20 kV, $X_d = 15\%$
G ₂	300 MVA, 18 kV, $X_d = 20\%$
G ₃	300 MVA, 20 kV, $X_d = 20\%$
T ₁	300 MVA, 220Y/22 kV, $X_d = 10\%$
T ₂	Three single-phase units each rated 100 MVA, 130Y/25 kV, $X = 10\%$
T ₃	300 MVA, 220/22 kV, $X = 10\%$

3. Table shows a three bus power system with line impedance.

From	To	Line impedance
1	2	0.4j
1	3	0.3j
2	3	0.2j

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

Bus 2 : PV bus, $V = 1.0$ p.u. $P = 3$ p.u.

Bus 3 : PQ bus, $P = 4$ p.u., $Q = 2$ p.u.

Neglect limits on reactive power generation. Carry out one iteration of load flow solution by Gauss Seidel method. Acceleration factor is 1.6

OR

4. (a) Explain the step by step computational procedure for the Newton Raphson method in load flow studies with appropriate expression. (15)
- (b) Derive the power flow equation in rectangular form (5)

5. (a) A power plant has three units with the following fuel cost equations:

$$F_1 = 0.05P_1^2 + 23.5P_1 + 700 \text{ Rs./hr.}$$

$$F_2 = 0.2P_2^2 + 20P_2 + 850 \text{ Rs./hr.}$$

$$F_3 = 0.09P_3^2 + 18P_3 + 960 \text{ Rs./hr.}$$

Maximum and minimum loading on each unit is 150 MW and 40 MW, the demand is 275 MW. Find the optimal scheduling and fuel cost. (10)

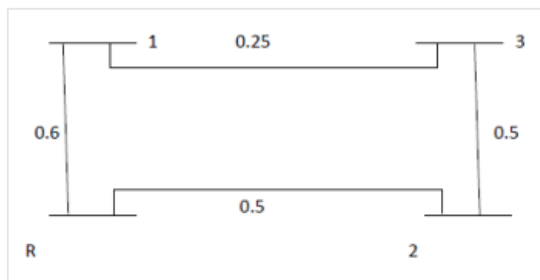
- (b) Derive the loss formula coefficients expression in economic load dispatch (10)

OR

6. Brief about the following

- a. Hydro thermal scheduling (4)
- b. Unit Commitment (8)
- c. Causes for voltage instability (8)

7. Obtain the Z_{BUS} for the sample system shown in Figure. Modify the Z-bus after removing the line between Bus 2 & Bus 3.



OR

8. a). Derive the Fault current expression for double line to line fault occurs in a power system. (10)
- b). Give the elementary idea of equal area criteria and swing equation in power system stability. (10)
9. a) Write down the step by step procedure to solve the swing equation using Runge Kutta Method. (10)
- b) Brief about Power Quality issues, consequences and its International standards (10)

Wishing you All the Best
