Electrical Power System (CBCS and Old Pattern) M.Tech. Second Semester Old+CBCS

PEPS241 - Elective-II : Computer Applications in Power Systems

P. Pages : 2 **GUG/W/18/11025**

Time : Three Hours * 3 1 4 5 * Max. Marks : 70

Notes : 1. All questions carry equal marks.
2. Answer **any five** questions.
3. Assume suitable data wherever necessary.

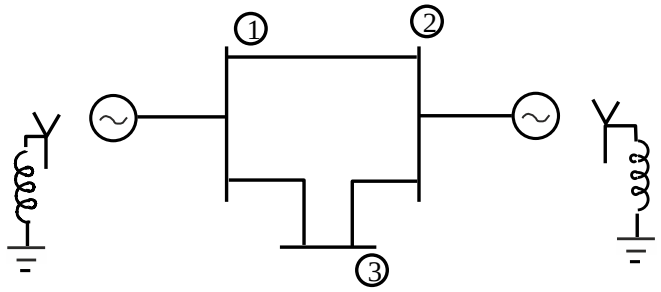
1. a) Prove that is Non-Singular transformation. $Z_{bus} = K^T \cdot ZBR \cdot K$ **7**
Where, all the abbreviations have their conventional meanings.

b) Explain the necessity of transformer modeling for power system studies. **7**

2. a) Derive equation for flux linkage across dq0 axis using dq0 transformation. **8**

b) Compare parks transformation with that of symmetrical components transformation. **6**

3. a) For the sample power system shown in fig. as the following sequence reactances is in P.U. **8**

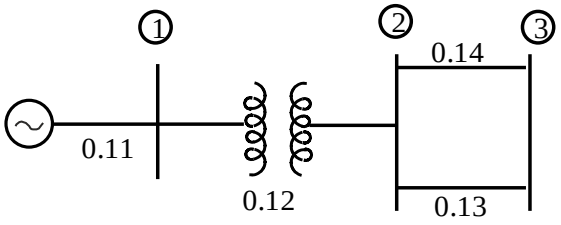


$G_1 \& G_2 ; x_1 = x_2 = 0.1025 , x_0 = 0.035$
$line(1-2); x_1 = x_2 = 1.0 , x_0 = 2.5$
$line(1-3); x_1 = x_2 = 0.4 , x_0 = 1.0$
$line(2-3); x_1 = x_2 = 0.4 , x_0 = 1.5$

For 3ϕ to ground fault on bus ②. Find fault current and bus voltage during fault.

b) Explain the necessity of short circuit studied. **6**

4. a) Consider a 3ϕ to ground fault occur on bus 3 of the same power system shown in the fig. positive sequence reactance of the elements are shown in fig. Calculate **7**
i) Short ckt current
ii) Voltage at bus 3 during fault.
iii) Current in phase B of the network element the self impedance are given in p.u and fault impedance in 0.38 p.u.



b) Represent & Derive an expression for: **7**
i) Faulted Bus voltage
ii) Fault current
When 3ϕ to Ground fault occurs at bus 'P' in a power system for short circuit studies.

5. a) Develop a flow chart for Modified Euler's method for transient stability studies. **7**

b) Derive the swing equation of the machine connected to an infinite bus through transmission network. **7**

6. a) Explain the necessity of load flow analysis in power system and what are the different types of buses named in load flow Analysis. **8**

b) State Assumptions made for transient stability studies. **6**

7. a) Explain load flow Analysis using Gauss-Seidal interactive solution with the help of Flow-Chart. **7**

b) State the factors affecting transient stability. **7**

8. a) Derive Co-ordinate equation using Lagrange method for the solution of economic schedule. **8**

b) The Fuel cost function in s/n for three thermal plants are given by **6**

$$F_1 = 350 + 7.2PG_1 + 0.004PG_1^2$$

$$F_2 = 500 + 7.3PG_2 + 0.0025PG_2^2$$

$$F_3 = 600 + 6.74PG_3 + 0.003PG_3^2$$

PG_1, PG_2, PG_3 are in MW. Find the optimal schedule and compare the cost of the case when the generators share load equally if

i) $P_D = 450\,MW$

ii) $P_D = 800\,MW$

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