

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
FIRST SEMESTER M.TECH DEGREE EXAMINATION, FEB. 2016

**Electrical and Electronics department**  
**(Power Systems/Power Electronics & Power Systems)**  
**04EE 6403 Computer Applications in Power Systems**

Max. Marks : 60

Duration:3 Hrs

***Part A (Answer All, Each Carrying 03 Marks)***

1. Explain about the element-node incidence matrix and bus incidence matrix.
2. Explain the various types of buses considered during power system load flow analysis.
3. Briefly explain about triangular factorization.
4. Write a short note on Thyristor Controlled Series Compensator.
5. What is the need for short circuit studies or fault analysis?
6. What are the assumptions to be made for the short-circuit studies of a large power system network?
7. Explain the various types of unsymmetrical faults. What are the causes of unsymmetrical faults?
8. Explain the short circuit calculations using  $Z_{bus}$ .

**[03 X 08 = 24 Marks]**

***Part B (Answer All, Each Carrying 06 Marks)***

9. Obtain the generalized algorithmic expression for bus impedance matrix elements when a branch is added to the partial network.

*OR*

10. Explain the modification of  $Z_{bus}$  matrix due to changes in primitive network.

11. Explain the AC/DC load flow.

*OR*

12. Explain in detail fast decoupled load flow.

13. Explain the representation of various power system components in a network.

OR

14. Explain optimal ordering.
15. Explain the working of UPFC.

OR

16. Explain the need of the shunt compensators. Explain the working of SVC.
17. How hybrid matrix is used in short circuit studies?

OR

18. Obtain the algorithm for calculating system conditions after the occurrence of LG fault.
19. Two 11kV, 20MVA, 3Phase, star connected generators operate in parallel as shown in Fig.1.

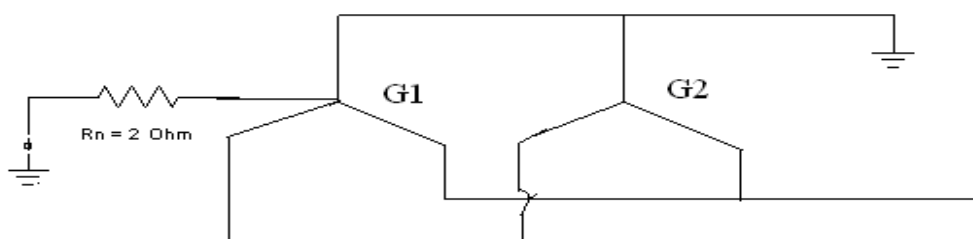


Fig.1

The positive, negative and zero sequence reactances of each being respectively,  $j0.18$ ,  $j0.15$ ,  $j0.1$  p.u. The star point of one of the generator is isolated and that of other is earthed through a 2-Ohm resistor. A single line to ground fault occurs at the terminals of one of the generators. Estimate

- Fault current
- Current in grounded resistor
- Voltage across the grounding resistor

*OR*

20. A salient – pole generator without dampers is rated 20MVA , 13.8 KV and has a direct axis subtransient reactance of 0.25 pu. The negative and zero sequence reactance are 0.35 pu and 0.10 pu respectively . The neutral of the generator is solidly grounded . Determine the subtransient current in the generator and the line to line voltages for subtransient condition when a single line to ground fault occurs at the generator terminals with generator operating unloaded at rated voltage neglect resistance.

**[06 X 06 = 36 Marks]**