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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER M. TECH DEGREE EXAMINATION

Electrical and Electronics Engineering

04EE6403—Computer Applications in Power Systems

Max. Marks: 60 Duration: 3 Hours

PARTA

Answer All Questions

Each question carries 3marks

1. Define the terms a) Cutset matrix b) Tree c) bus incidence matrix with an example.
2. Compare Gauss Seidel and Newton Raphson method.
3. Determine by L Matrix and U matrix by LU decomposition for the following equations $X_1+X_2-X_3=4$, $X_1-2X_2+3X_3=-6$, $2X_1+3X_2+X_3=7$.
4. Explain the performance characteristics of SVC as FACTS device in power system.
5. Determine Z_{pq}^{012} for Z_{pq}^{abc} with diagonal elements Z_s and off diagonal elements $Z_{m..}$
6. Write a brief note on symmetrical and asymmetrical faults in power system.
7. Discuss the analysis of L-G fault in short circuit studies.
8. Explain briefly about the sequence network in power systems.

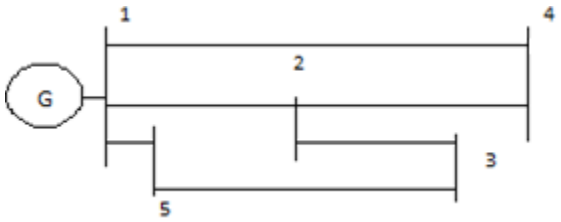
PARTB

Each question carries 6 marks

9. Discuss the Z_{bus} building algorithm for branch addition of a primitive network.

OR

10. Derive the Z_{bus} building algorithm for link addition.
11. Consider the power system shown in figure. The data for the system is given in table. Obtain the bus voltages at the end of first iteration by applying Gauss Seidal method.
    The datas given in table are per unit values.



Starting bus	Ending bus	R	X
1	2	0.10	0.40
1	4	0.15	0.60
1	5	0.05	0.20
2	3	0.05	0.20
2	4	0.10	0.40
3	5	0.05	0.20

Bus no	P_G	Q_G	P_D	Q_D	Vsp	δ
1	-	-	-	-	1.02	0^0
2	-	-	0.60	0.30	-	-
3	1.0	-	-	-	1.04	-
4	-	-	0.40	0.10	-	-
5	-	-	0.60	0.20	-	-

OR

12. Explain the Fast decoupled method of power flow analysis with help of algorithm. What are the merits of fast decoupled method over conventional techniques?
13. Determine ABCD parameters of rigorous transmission line network. Draw the equivalent circuit model of a pi network

OR

14. Develop the synchronous machine modelling representation with amortisseur windings for power system studies.
15. Explain the role SVC in power system. Describe how it influence load flow with necessary equations

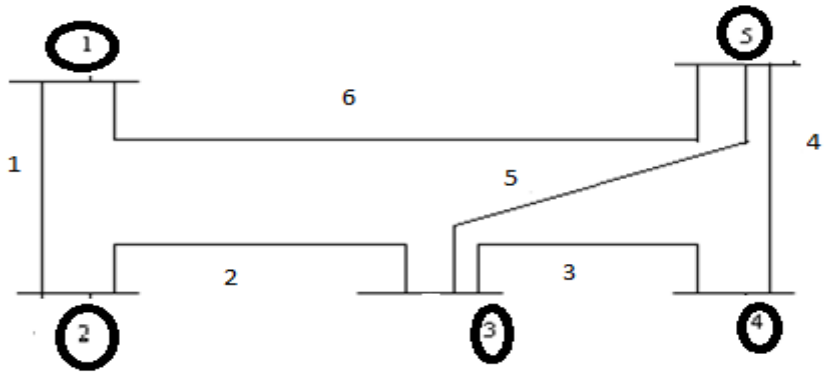
OR

16. Discuss the working of UPFC as a flexible ac transmission device in power system.
17. State the assumptions for short circuit studies of large power sytem.Develop the algorithm for three phase to ground fault at bus p with fault impedance Z_f and ground impedance Zg with expressions for post fault current and post fault voltages at bus p.

OR

18. Determine Post fault voltage and post fault current of bus 5 for three phase to ground fault after formulating $Z_{bus}$for the network provided as follows.

Element no	Bus code	Self-impedances(Z_{pq}^{012})		
1	1-2	0.05	0.20	0.20
2	2-3	0.05	0.15	0.15
3	3-4	0.06	0.25	0.25
4	4-5	1.02	0.50	0.50
5	3-5	1.50	0.80	0.80
6	1-5	2.50	1.50	1.50



19. Obtain the expression for fault bus currents and voltages by doing short circuit analysis on a large power system where a L-G fault occurs at any one of the buses.

or

20. A Synchronous generator and motor are rated 25MVA,11kV having 15% sub transient reactance are connected through transformer and a transmission line. The transformers are rated 25MVA,11/66kV and 66/11kV with a leakage reactance of 10% each. The transmission line has reactance of 10% on a base of 25MVA, 66kV.The motor is drawing 15kW at 0.8pf leading and the terminal voltage is 10.6kV when a symmetrical three phase fault occurs at the motor terminal. Find the sub transient current in generator, motor and fault.