Reg. No. : | | | | | | | | | | |

Question Paper Code: 31353

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2017

Fifth Semester

Electrical and Electronics Engineering

01UEE503 – POWER SYSTEM ANALYSIS

(Regulation 2013)

Duration: Three hours Maximum: 100 Marks

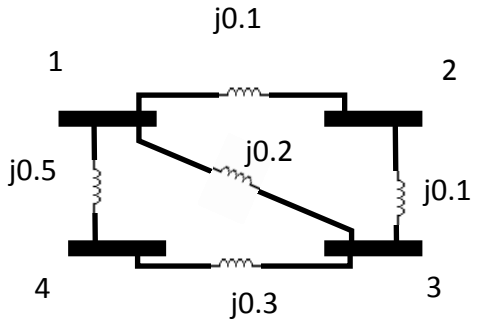
Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. Draw the equivalent circuit of a two winding transformer.
2. Represent the equations to compute diagonal and off-diagonal elements of Y bus for a 3 bus system.
3. Justify the need for acceleration factor in load flow algorithms?
4. Differentiate generator bus and slack bus.
5. What are the causes for faults in power system?
6. State the equation to determine symmetrical component voltages from unbalanced phase voltages.
7. Show that neutral current is zero in balanced three phase circuit.
8. List the types of unsymmetrical faults.
9. Suggest any two ways to improve transient stability of a power system.
10. Mention the applications of swing curves.

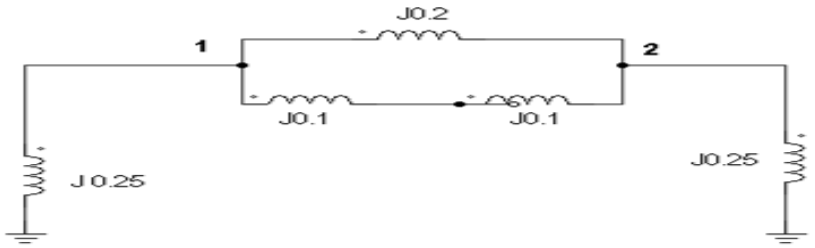
PART - B (5 x 16 = 80 Marks)

11. (a) Determine the bus impedance matrix for the network shown below using bus building algorithm. The given values are impedances. (16)



Or

(b) Form the Y Bus matrix for the network shown below using singular transformation method. The given values are primitive admittances. (16)



12. (a) Construct the equations to determine the jacobian matrices for Newton Raphson method to solve load flow for an n bus system with a slack bus and load buses. (16)

Or

(b) Construct an algorithm using Gauss-Seidal method to determine load flow solution for a power system network with PQ buses alone. (16)

13. (a) Construct the positive sequence, negative sequence and zero sequence impedance networks of a synchronous machine on no-load using the concept of symmetrical components. (16)

Or

(b) Construct the positive sequence, negative sequence and zero sequence impedance networks of a transformer using the concept of symmetrical components. (16)

14. (a) A synchronous generator and motor are rated 30 MVA, 13.2 KV and both have sub transient reactance of 20%.The line connecting them has a reactance of 10 % on the base of the machine ratings. The motor is drawing 20,000 KW at 0.8 power factor leading and terminal voltage of 12.8 KV when a symmetrical three phase fault occurs on the motor terminals. Find the sub transient current in the generator, motor and fault by the internal voltage of the machines. (16)

Or

(b) A three phase transmission line operating at 33 KV and having a resistance and reactance of 5 ohm and 20 ohm respectively is connected to a generating station bus bar through a 15 MVA, 11/33 KV step up transformer which has a reactance of 0.06 p.u. The two generators are rated 10 MVA and 5 MVA with reactance of 0.1 p.u and 0.075 p.u respectively. Calculate the short circuit MVA and the fault current when a 3 phase short circuit occurs at the at the load end of the transmission line. (16)

15. (a) Consider a solidly grounded 50 Hz machine for which H= 2.4MJ/MVA and it is normally operating in steady state with input and output of 1 p.u and an angular displacement of 45 electrical degree with respect to an infinite bus bar. Upon occurrence of a fault assume that the input remains constant and the output is given by $P_e = \delta/80$.Calculate and plot swing curve by step by step method. Using the time interval $\Delta t = 0.05$ s up to t=0.5s. (16)

Or

(b) Illustrate the concept of equal area criterion and its applications. (16)