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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, August - 2022
POWER SYSTEM OPERATION AND CONTROL
(Electrical and Electronics Engineering)

Time: 3 Hours
Max.Marks:75

Answer any five questions
All questions carry equal marks

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1.a) Explain the procedure for formation of nodal admittance matrix by step by step procedure.

 b) Form the Y_{BUS} for the network shown in figure, including the generator buses 1 and 2 with impedance of 0.1, 0.4 p.u. respectively. All the values are p.u. impedances for the network. [7+8]
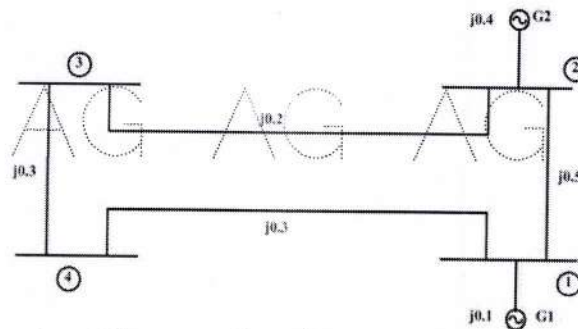
2.a) Explain about the classification of buses with neat sketch.

 b) Explain Gauss-Seidel iterative method for power flow analysis of any power system with a flow chart. [6+9]

3.a) Derive generalized expression for transmission loss in a n-bus network.

 b) 150 MW, 220 MW and 220 MW are the ratings of three units located in a thermal power station. Their respective incremental costs are given by the following equations:

$$\frac{dC_1}{dP_1} = Rs(0.11P_1 + 12)$$

$$\frac{dC_2}{dP_2} = Rs(0.095P_2 + 14)$$

$$\frac{dC_3}{dP_3} = Rs(0.1P_3 + 13)$$

Where P_1, P_2 and P_3 are the loads in MW. Determine the economical load allocation between the three units, when the total load on the station is (i) 350 MW (ii) 500 MW. [6+9]

4.a) Define penalty factor and state its significance.

 b) Derive relevant equations to explain economic dispatch of thermal plants coordinating the system transmission losses. [7+8]

5.a) Derive the model of speed governing system and hence draw its block diagram.
b) A 100 MVA synchronous generator operates on full load at a frequency of 50 Hz. The load is suddenly reduced to 50 MW. Due to time lag in governor system, the steam valve begins to close after 0.4 sec. Determine the change in frequency that occurs in this time. [7+8]

6.a) What are the basic requirements needed for control strategy in Load Frequency Control (LFC) system.
b) Obtain the mathematical modeling of tie line power in an inter connected system and its block diagram. [7+8]

7.a) Give the list of methods improving transient stability of the system.
b) Derive the equal area criterion of stability and explain clearly how you can determine the stability limit of a synchronous motor when there is a sudden change in the mechanical load on the motor. [7+8]

8.a) What are the steps to be followed in planning of a computer control?
b) Explain the implementation of SCADA system in the electric utility. [7+8]

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