Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII EXAMINATION – WINTER 2015

Subject Code: 170901 Date: 12/12/2015

Subject Name: Inter Connected Power System

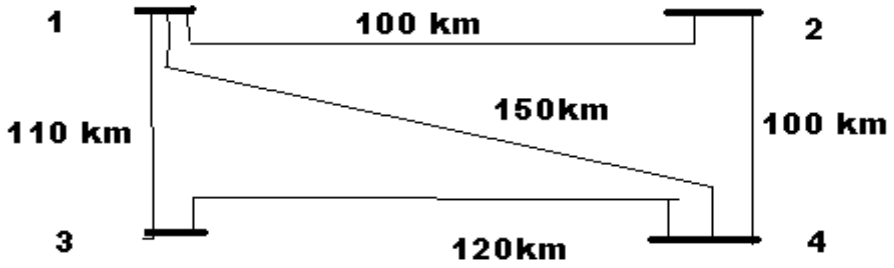
Time: 10:30am to 1:00pm Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Explain the Method of formation of YBus using singular transformation method. **07**

(b) For the systems shown in the Fig. find the primitive admittance matrix of the system. It is given that all the lines are characterized by a series impedance of 0.1 +j 0.7 Ω/km and a shunt admittance of j0.35 * 10^{-5} mho/km. Lines are rated at 220kV and base MVA is 100 **07**



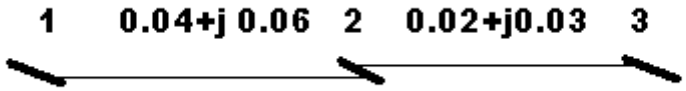
Q.2 **(a)** Explain steps for modification of Zbus when a link is added to the existing network. None of the bus is a ground to which this link is connected **07**

(b) List the advantages and disadvantages of Inter connected power systems. **07**

OR

(b) State the Names load dispatch centre in hierarchical order and explain its functioning **07**

Q.3 **(a)** For the system shown in the Fig. obtain V_2, δ_2 after first iteration using G S Method. Given, Bus 1 is slack bus V1 =1, $\delta_1 = 0$, $P_2 + Q_2 = -5.96 + j\ 1.46$ and $|V_3| = 1.02,\ \delta_3 = 0$ **07**



(b) Compare GS method of load flow study with NR method **07**

OR

Q.3 **(a)** Derive Static Load Flow Equations (SLFE) from the first principle. Write expression of P2 and Q2 in expanded form for the 3 bus system Assume Y bus is given. **07**

(b) Explain approximate load flow solution method with necessary assumptions **07**

Q.4 **(a)** Explain AGC with a neat block diagram **07**

(b) Two generators rated 200 MW and 400 MW are operating in parallel. The droop characteristics of their governors are 4% and 5% respectively from no load to full load. The speed changers are so set that the generators operate at **07**

50 Hz sharing the full load of 600 MW in the ratio of their ratings. If the load reduces to 400 MW how will it be shared among the generators and what will the systems frequency be? Assume free governor operation.

OR

Q.4 **(a)** A constant load of 300 MW is supplied by two 200 MW generators, 1 and 2 for which the respective incremental fuel costs are **07**

$$\frac{dC_1}{dP_{G1}} = 0.10P_{G1} + 20.0 \text{ and}$$

$$\frac{dC_1}{dP_{G2}} = 0.12P_{G2} + 15.0$$

With power PG in MW and costs C in Rs/hr. Determine the most economical division of load between the generators, and saving in Rs/day thereby obtained compared to equal load sharing between machines.

(b) Derive expression for β coefficients (Loss co coefficients) for a sample system. Make necessary assumptions **07**

Q.5 **(a)** Write real power transfer equation between two buses in a given power systems. From the equation, discuss the methods of improving steady state angle stability in a power system. **08**

(b) A two pole, 50 Hz, 11kV turbo generator has a rating of 100MW, power factor 0.85 lagging. The rotor has a moment of inertial of 10,000kg-m^2. Calculate H and M. **06**

OR

Q.5 **(a)** A power deficient area receives 50 MW over a tie line from another area. The maximum steady state capacity of the lie line is 100MW. Find the allowable sudden load that can be switched on without loss of stability **07**

(b) Explain Step by Step method for stability analysis **07**

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