

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-VII • EXAMINATION – WINTER 2013

Subject Code: 170901**Date: 26-11-2013****Subject Name: Interconnected Power Systems****Time: 10:30 TO 01:00****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) Write a short note on how black out occurs in a large size power system. **07**
 (b) Give a list of methods to improve transient stability of a large size power system. **07**
Q.2 (a) Describe the advantages of interconnections of power systems in details. **07**
 (b) Give comparison of GS method and NR method used for load flow studies of power systems. **07**

OR

- (b) Write a short note on islanding of part of power system. **07**
Q.3 (a) Discuss the algorithm of load flow solution using Newton-Raphson method for all type of buses. **10**
 (b) Describe the concept of steady state stability in brief. **04**

OR

- Q.3** (a) State the assumptions made for load flow studies and applications of load flow studies. **07**
 (b) Table given below gives the information of a four bus transmission network with line impedances. The shunt admittance at all the buses is assumed negligible. Form a suitable graph and find primitive admittance matrix and bus incidence matrix of the network. Find Ybus of the system using these matrices. **07**

Line, bus to bus	R in pu	X in pu	Line, bus to bus	R in pu	X in pu
1-2	0.05	0.15	2-4	0.1	0.3
1-3	0.1	0.3	3-4	0.05	0.15
2-3	0.15	0.45			

- Q.4** (a) Describe unit commitment in detail. **07**
 (b) Derive the expression for B-coefficients in case of two generating plants connected to an arbitrary number of loads through a transmission network. **07**

OR

- Q.4** (a) Explain the functions of load dispatch centre in detail. **07**
 (b) Describe the methods of voltage control adopted for large size power system in detail. **07**
Q.5 (a) Describe flat frequency control and selective frequency control used for controlling frequency in power system. **07**
 (b) In a two-bus system, two power plants are connected by a transmission line. If 100 MW is transferred from plant 1 to the load connected at bus 2, a transmission loss of 10 MW is incurred. Find the required generation for each plant and the power received by load when the system λ is Rs 250/MWh. The incremental fuel costs of the two plants are given below: **07**

$$\frac{dC_1}{dP_{G1}} = 0.02P_{G1} + 16.0 \frac{Rs}{MWh}$$

$$\frac{dC_2}{dP_{G2}} = 0.04P_{G2} + 20.0 \frac{Rs}{MWh}$$

OR

- Q.5 (a)** Discuss procedure for solving the swing equation using point by point method. **07**
- (b)** A synchronous generator of reactance 1.2 pu is connected to an infinite bus bar ($|V| = 1.0$ pu) through transformers and a line of total reactance of 0.06 pu. The generator no load voltage is 1.2 pu and its inertia constant is $H=4$ MW-s/MVA. The resistance and machine damping may be assumed negligible. The system frequency is 50 Hz. Calculate the frequency of natural oscillations if the generator is loaded to (i) 50 % and (ii) 80 % of its maximum power limit. **07**
