

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY
PDDC- SEMESTER VII- • EXAMINATION – SUMMER - 2016

Subject Code: X70902

Date: 25/11/2016

Subject Name: Interconnected Power Systems

Time: 10:30 AM to 1:00 PM

Total Marks: 70

Instructions:

1. Make suitable assumptions wherever necessary.
2. Figures to the right indicate full marks.
3. Symbols have their usual meanings

Q.1

- (a) Under which conditions cascade tripping occurs in interconnected power systems? What are the effects of cascade tripping? Also explain network islanding in brief (7)
- (b) What is Load Dispatch Centre? Explain the functions carried out by LDC (7)

Q.2

- (a) What is primitive network? Explain the formulation of Y_{BUS} by singular transformation (7)
- (b) Derive Static Load Flow Equations. State the assumptions made in approximate load flow and explain how SLFE's are modified due to these assumptions (7)

OR

- (b) Determine the Y_{BUS} matrix for the power system shown in figure 1 (7)

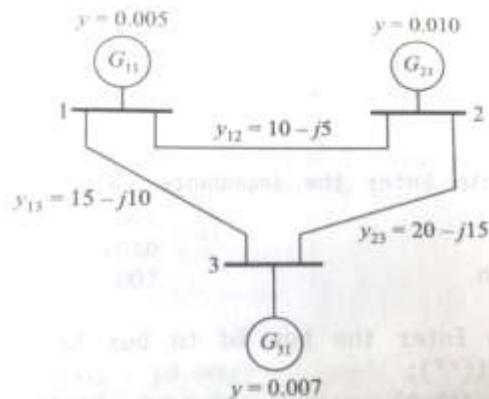
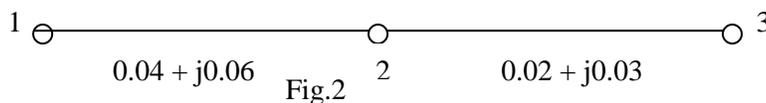


Figure 1

Q.3

- (a) With the help of flowchart, explain GS method of load flow in detail (9)
- (b) For the network shown in figure 2, obtain the complex bus bar voltage at bus 2 at the end of first iteration using GS method. Line impedances are marked in pu. Bus 1 is slack bus with $V_1 = 1 + j0.$, $P_2 + jQ_2 = -5.96 + j1.46$, $|V_3| = 1.02$ (5)



OR

Q.3

- (a) Discuss NR method of load flow. On what factors does the size of the Jacobian depend? (9)
Explain how the values of Jacobian elements H, N, J and L can be obtained.
- (b) Discuss different methods of voltage control in brief (5)

Q.4

- (a) With the help of neat diagram explain flyball speed governing mechanism (7)
- (b) Explain tie line load bias method of frequency control (7)

OR

Q.4

- (a) Derive the condition for most economic dispatch when transmission losses are considered (7)
- (b) A two bus system is shown in figure 3. If 100 MW is transmitted from plant 1 to the load, it results in a transmission loss of 10 MW. Find the required generation for each plant and the power received by the load when the system λ is Rs. 25/MWh. The incremental costs of the two plants are given below (7)
- $$dF_1/dP_1 = 0.02P_1 + 16 \text{ Rs/MWh}$$
- $$dF_2/dP_2 = 0.04P_2 + 20 \text{ Rs/MWh}$$



Figure 3

Q.5

- (a) Derive swing equation for a synchronous machine (7)
- (b) What is synchronizing co-efficient of machine? Prove that synchronizing co-efficient of the machine should be positive for steady state stability (7)

OR

Q.5

- (a) Explain equal area criteria for stability (7)
- (b) Explain the factors affecting transient stability. Discuss the methods employed for improving transient stability (7)