Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER–VII EXAMINATION – SUMMER 2016

Subject Code:X70902 **Date:12/05/2016**

Subject Name: Interconnected Power Systems

Time:02:30 PM to 05:00 PM **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) What is load flow? Explain why do we need load flow study? (4)

(b) Define steady state, transient and dynamic stability (4)

(c) With the help of a neat diagram explain flyball speed governing mechanism (6)

Q.2

(a) Form Y_{BUS} for the system whose data is given below (7)

Line, bus to bus	R, pu	X, pu
1-2	0.05	0.15
1-3	0.10	0.30
2-3	0.15	0.45
2-4	0.10	0.30
3-4	0.05	0.15

(b) Starting from the first principles derive swing equation (7)

OR

(b) What is difference between economic load dispatch and unit commitment? Explain in brief unit commitment using dynamic programming method (7)

Q.3

(a) Explain Gauss-Siedel method of load flow with the help of flow-chart (9)

(b) Give classification of different types of buses in power system (5)

OR

Q.3

(a) Derive the expression for B-loss coefficients for a two generator system. State the assumptions made (9)

(b) In a two plant system consisting of two generators, load is at plant 2. If 100 MW is supplied from plant 1 to the load, a transmission loss of 10 MW is incurred. Find the required generation for each plant and the power received by the load when the system λ is Rs 25/MWh. The incremental fuel costs of two plants are given below: (5)

$dF_1/dP_1 = 0.02P_1 + 16.00$ Rs/MWh

$dF_2/dP_2 = 0.04P_2 + 20.00$ Rs/MWh

Q.4

(a) Explain the steps involved in formulation of Z_{BUS} matrix (9)

(b) Discuss various methods of voltage control in brief (5)

OR

Q.4

(a) Explain flat frequency control and selective frequency control (7)

(b) Derive the criteria for most economic dispatch when transmission losses are considered (7)

Q.5

(a) A single generator is feeding power to an infinite bus through a single transmission line. A three phase fault occurs near the generator terminals which reduces the power transfer to zero. When the fault is cleared the original conditions are restored. Derive the formula for critical clearing angle and critical clearing time (7)

(b) A generator and transformer having combined transient reactance X'd = j0.3 pu is connected to infinite bus through two parallel lines each having reactance of j0.4 pu. The machine is delivering 1.0 per unit power. The output current from the generator is $1.012\angle 8.729^0$. Calculate the critical clearing angle and critical clearing time if a fault occurs near the generator terminal. Take H = 5 MJ/MVA and f = 60 Hz (7)

OR

Q.5

(a) Explain the numerical solution of swing equation (8)

(b) Discuss the methods of improving steady state stability (6)