

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY
PDDC SEMESTER VII– EXAMINATION – SUMMER 2017

Subject Code: X70902

Date: 01/05/2017

Subject Name: Interconnected Power Systems

Time: 02.30PM to 05.00PM

Total Marks: 70

Instructions:

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

Q.1

- (a) Explain the process of formulation of Y_{BUS} matrix using singular transformation (7)
- (b) Explain the concept of interconnection. State the advantages and disadvantages of interconnections. (7)

Q.2

- (a) Derive static load flow equations (SLFE). Also state the assumptions made in approximate load flow and explain how SLFE's get modified due to these assumptions. (7)
- (b) Explain in brief, how unit commitment problem can be solved using dynamic programming method (7)

OR

- (b) With the help of neat diagram explain fly ball speed governing mechanism (7)

Q.3

- (a) With the help of flowchart explain GS method of load flow (8)
- (b) Compare NR and GS method of load flow (6)

OR

Q.3

- (a) A certain power system network has the following data (7)

<u>Bus code</u>	<u>Line reactance/km</u>	<u>Shunt susceptance/km</u>	<u>Length(km)</u>
1-2	j0.001	j0.0016	100
2-3	j0.001	j0.0016	200
1-3	j0.001	j0.0016	250

Compute Y_{BUS} for the network neglecting line resistance

- (b) Derive the expression for most economical operation taking transmission losses into account (7)

Q.4

- (a) Derive transmission loss formula in terms of B-coefficients (8)
- (b) Two generators rated 200 MW and 400 MW are operating in parallel. The droop characteristics of their governors are 4% and 5% from no-load to full load respectively from no-load to full load. Assuming that the generators are operating at 50 Hz at no-load, how a load of 600 MW would be shared between them, and what would be the system frequency? (6)

OR

Q.4

- (a) Starting from the first principles, derive swing equation (8)
- (b) Explain equal area criteria of stability (6)

Q.5

- (a) Two turbo-alternators with ratings given below are interconnected via a short transmission line (7)
 - Machine 1: 4 pole, 50 Hz, 60 MW, pf 0.80 lagging, moment of inertia 30,000 kg-m²
 - Machine 2: 2 pole, 50 Hz, 80 MW, pf 0.85 lagging, moment of inertia 10,000 kg-m²
 - Calculate the inertia constant of the single equivalent machine on a base of 200 MVA
- (b) Explain the significance of synchronous coefficient of the machine in steady state stability analysis (7)

OR

Q.5

- (a) Explain numerical solution of swing equation (7)
- (b) Discuss the methods employed to improve transient and steady state stability (7)
