



BTECH
(SEM VII) THEORY EXAMINATION 2023-24
POWER SYSTEM OPERATION & CONTROL

TIME: 3 HRS

M.MARKS: 100

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt all questions in brief.

Q no.	Question	Marks	CO
a.	Why is voltage and frequency control important in power systems?	2	CO1
b.	What is the basic structure of power systems?	2	CO1
c.	Why is load frequency control required in a power system?	2	CO2
d.	What do you mean by two area power system?	2	CO2
e.	How does a tap-changing transformer contribute to voltage control?	2	CO3
f.	List two types of excitation systems used in power systems.	2	CO3
g.	Why is it important to consider transmission losses in optimal power system operation?	2	CO4
h.	Briefly explain the input-output characteristics of thermal power plants.	2	CO4
i.	Name three different operating states in a power system.	2	CO5
j.	Briefly explain the purpose of Distribution Factors in power systems.	2	CO5

SECTION B

2. Attempt any three of the following:

a.	What do you mean by "SCADA" system? Discuss the SCADA system and its components with the help of block diagram.	10	CO1
b.	What are the components of speed governor system of an alternator? Derive its transfer function with the help of a neat block diagram.	10	CO2
c.	Mention various methods of voltage control and explain any three methods in detail.	10	CO3
d.	How is the optimal scheduling of a hydrothermal plant done? Discuss	10	CO4
e.	Discuss some challenges associated with maintaining power system security. How do uncertainties in load demand, equipment failures, or unexpected events contribute to these challenges?	10	CO5

SECTION C

3. Attempt any one part of the following:

a.	Describe the EMS and its major functions in power system operation and control	10	CO1
b.	Explain power scenario in Indian grid, National and regional load dispatching centers.	10	CO1

4. Attempt any one part of the following:

a.	Draw the block diagram of load frequency control of single area power system and derive its dynamic response.	10	CO2
b.	Describe Tie line modeling of a two area power system in detail.	10	CO2

5. Attempt any one part of the following:

a.	Draw the circuit diagram for a typical excitation system, Draw the block diagram and derive the transfer function model.	10	CO3
b.	Discuss the static and dynamic analysis of automatic voltage regulators.	10	CO3

6. Attempt any one part of the following:

a.	Two generators rated at 120 MW and 250 MW are operating in parallel. The governor setting on the machines are such that they have 4% and 3% droop. Determine the load taken by each machine for a total load of 200 MW.	10	CO4
b.	Explain the concept of unit Commitment method in detail.	10	CO4

7. Attempt any one part of the following:

a.	Explain Non-Linear models for state estimation.	10	CO5
b.	Explore the role of emerging technologies, such as machine learning or advanced sensors, in enhancing power system security. How can these technologies be integrated into existing power systems for better monitoring and control?	10	CO5