



**K. K. Wagh Institute of Engineering Education & Research, Nashik**  
(An Autonomous Institute From A.Y. 2022-23)

WINTER-2024	
Exam Seat No.:	
Academic Year:2024-2025	Semester:I
Class:PG-I	Program:M.Tech
Branch Code:ELE	Pattern:2024
Name of Course:Power System Dynamics	Course Code:2406502
Max. Marks:60	Duration:2.30 Hrs.

**Instructions:** Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains \_\_2\_\_ page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

**Marks CO**

**Question No. 1**

- 1a) What is the equal area criterion? Derive the condition of equal area criteria and discuss various cases of it. (6) CO1

**Question No. 2**

- 2a) What is the modeling of the synchronous machine? Explain it in details and write the voltage equations of the stator and rotor winding. (6) CO2

**Question No. 3**

- 3a) Derive stability criteria of single machine system using Routh hurwitz criteria. (8) CO3, CO4
- 3b) What are the various Heffron-Philips constants. Derive each of them for the single machine system. (8) CO3, CO4

**OR**

- 3c) Derive the mechanical equation for the rotor and the torque angle loop of a single-machine system. Additionally depict the excitation system. (8) CO3, CO4
- 3d) Describe the small signal analysis of a single machine system using a block diagram representation. (8) CO3, CO4

**Question No. 4**

- 4a) Explain the method by which the power system stabilizer are controlled. (8) CO3, CO4
- 4b) Explain the dynamic compensator, Torsional filter and limiter of PSS circuits. (8) CO3, CO4

**OR**

- 4c) How the tuning of the power system stabilizer are performed. Describe the operational experience of PSS. (8) CO3, CO4

- 4d) Explain the power system stabilizer in details. (8) CO3, CO4

**Question No. 5**

- 5a) Explain voltage instability and collapse and factor affecting to it. (8) CO1, CO3
- 5b) Compare the angle and voltage stability. Also explain the interdependence and overlap between them. (8) CO1, CO3

**OR**

- 5c) Compare the voltage instability and collapse. Also explain the key feature of the them. (8) CO1, CO3
- 5d) Describe the method to control the voltage instability of the system. (8) CO1, CO3

**..... End of question paper.....**