

Power System Dynamics and Stability**(Power System and Control Automation)****Date: 28-07-2025****Time: 3 Hours.****Max. Marks: 70****Answer ONE Question from each UNIT and each question carries 14 Marks****UNIT-1**

1. Using the d-q variable model of synchronous machine with rotor having field winding and one q-axis winding .discuss the procedure to compute the steady state values.

[14 Marks;CO1;Apply]

(OR)

2. Derive the basic equation of stator and rotor of synchronous machine. Draw all the necessary illustrations. .

[14 Marks;CO1;Apply]

UNIT-2

3. A 60 Hz, 4 pole turbo-generators rated 100MVA, 13.8 KV has inertia constant of 10 MJ/MVA.

[14 Marks;CO2;Apply]

(a) Find stored energy in the rotor at synchronous speed.

(b)If the input to the generator is suddenly raised to 60 MW for an electrical load of 50 MW, find rotor acceleration.

(c) If the rotor acceleration calculated in part (b) is maintained for 12 cycles, find the change in torque angle and rotor speed in rpm at the end of this period.

(d)Another generator 150 MVA, having inertia constant 4 MJ/MVA is put in parallel with above generator. Find the inertia constant for the equivalent generator on a base 50 MVA.

(OR)

4. A. Derive the steady- state Conditions for a single Machine Connected to an Infinite Bus through a Transmission line.

[07 Marks;CO2;Apply]

B. Derive the Steady-State Conditions for a single Machine connected to an infinite bus with local load .

[07 Marks;CO2;Apply]

UNIT-3

5. A. Explain Equal-Area criterion of Transient stability. [07 Marks;CO3;Understand]

B.What are the factors influencing the Transient Stability. [07 Marks;CO3;Understand]

(OR)

6. Explain the Runge-Kutta methods for the determination of transient stability.

[14 Marks;CO3;Understand]

UNIT-4

7. Explain the effect saturation saliency on power system stability.

[14 Marks;CO4;Understand]

(OR)

8. Explain the mechanical hydraulic control (MHC) of turbine-governing system.

[14 Marks;CO4;Understand]

UNIT-5

9. Obtain the transfer function of IEEE type-1 excitation system.

[14 Marks;CO5;Analyze]

(OR)

10. What do you mean by Static Exciter? Explain in brief. [14 Marks;CO5;Understand]

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