Register No.: …… Name: ……..

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

SECOND SEMESTER M.TECH DEGREE EXAMINATION (Regular), JULY 2022

POWER SYSTEMS

(2021 Scheme)

Course Code: **21PS203**

Course Name: **Power System Dynamics and Stability**

Max. Marks: **60** **Duration: 3 Hours**

PART A

(Answer all questions. Each question carries 3 marks)

1. Derive the expression for power – angle relationship of two machine system.
2. Consider a 555 MVA, 24 kV, 0.9 pf, 60 Hz, three phase, 2 pole synchronous generator. If the stator leakage inductance is 0.4129 mH, stator self-inductance L_d=4.9825 mH and L_q=4.8451 mH, determine mutual inductances L_{ad} and L_{aq} in Henry.
3. Describe how eigen values affect a dynamic system's stability.
4. Explain the effect of field flux variation on system stability.
5. Describe continuation power flow analysis.
6. Explain the term loadability limit of a power system.
7. Discuss the need of small signal stability enhancement.
8. Explain the independent pole operation of circuit breaker.

PART B

(Answer one full question from each module, each question carries 6 marks)

MODULE I

9. Explain in detail the classification of power system stability. (6)

OR

10. Describe and illustrate the structure of a power system. (6)

MODULE II

11. Develop the stator circuit equations in synchronous machine modeling. (6)

OR

12. Describe the per unit system representation for analysis of stator and rotor voltage equations of synchronous machine. Explain its significance. (6)

MODULE III

13. State swing equation of SMIB system and derive the same. Explain its physical significance. (6)

OR

14. With neat block diagram explain the state space representation of the dynamic system. (6)

MODULE IV

15. Analyze the influence of excitation system in classical model of a generator. (6)

OR

16. A 50 Hz synchronous generator having an internal voltage of 1.2 pu, H=5.2MJ/MVA and a reactance of 0.4 pu, is connected to an infinite bus through a double circuit line, each line has a reactance of 0.35 pu. The generator is delivering 0.8 pu power and infinite bus voltage is 1.0 pu. Determine (6)
    a) Steady state operating angle
    b) Synchronizing torque coefficient
    c) Natural frequency of oscillation if damping is negligible.

MODULE V

17. Explain the nose curve and describe the effect of power factors on the stability of a system. (6)

OR

18. Explain the block diagram representation of SMIB system with AVR and PSS. (6)

MODULE VI

19. Enumerate and describe various power system stabilizers used for the enhancement of small signal stability. (6)

OR

20. Explain any three methods of transient stability enhancement. (6)

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