

SUBJECT CODE NO:- P-8073
FACULTY OF ENGINEERING AND TECHNOLOGY
M.E. (Electrical Power System) Examination May/June 2017
Power System Dynamics & Stability
(Revised)

[Time : Three Hours]

[Max Marks :80]

Please check whether you have got the right question paper.

- N.B
- i) Answer any two questions from each section.
 - ii) Assume suitable data, if required.

Section A

- Q.1
- a) What is the classical model of a synchronous machine? What are the assumptions made in the classical model? Explain the dynamic of a synchronous machine. 10
 - b) A single line diagram of a system is shown in fig 1. 10

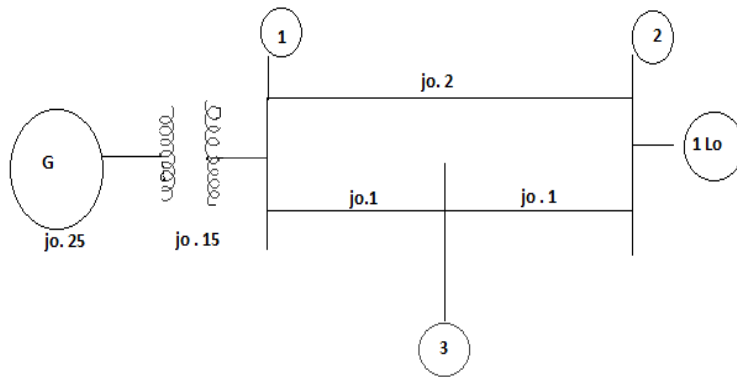


Fig 1. SLD for Q.# 1 (b)

All the values are in per unit on a common base. The power delivered into bus. 2 (an infinite bus having a voltage of \pm p. u.)1.0p.u. at 0.80 power factor lagging. Obtain the power angle equation and swing equation and swing equation for the system. Neglect all losses

- Q.2
- a) Explain the equal –area criterion for the stability of an alternator supplying infinite bus-bars via an inductive inters connector. 10
 - b) b) A loss free generator supplies 50 MW to an infinite bus, the steady-state limit of the system being 100 MW. Determine whether the generator will remain in reactance synchronism if the prime-mover input is abruptly increased by 30 MW. 10
- Q.3
- a) For the synchronous generator explain 10
 - i) Direct axis synchronous -reactance
 - ii) Quadrature –axis synchronous- reactance
 - iii) Direct axis transients open-circuit time constant T'_{do}
 - iv) Direct-axis transient start-circuit time constant T'_d
 - b) Explain the flux-linkage state space modes of synchronous machine. 10

Section-B

- Q.4 a) What are the main requirements of excitation system? Explain the brushless excitation system for 12 synchronous generator. 08
- b) Explain the role of Automatic voltage regulator in the operation of synchronous generator-in improving stability. 08
- Q.5 a) Explain the use of FACTS devices for power system stability- enhancement. 10
- b) With the help of block diagram, explain the generator excitation system-dynamics. 10
- Q.6 a) Explain the phenomenon of sub-synchronous frequency oscillations in multi machine power system with reference to stability. 10
- b) A 12 MVA, 5000 volts, 3 phase, 4 pole 50 HZ alternator is connected to infinite bus-bars. The short 10 circuit current is 4-times the normal full load current and the moment of inertia of the rotating system is 22000 kg-m^2 . Determine the frequency of oscillation of the generator system.