Code: 15A02802

R15

B.Tech IV Year II Semester (R15) Advanced Supplementary Examinations July 2019

POWER SYSTEM DYNAMICS & CONTROL

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

*****

1 Answer the following: (10 X 02 = 20 Marks)

(a) List out any two stability problems faced by power systems.
(b) Explain the concept of equilibrium.
(c) List out the major assumptions made for the classical model of generator.
(d) Derive the d-axis equivalent circuit of the synchronous machine.
(e) Briefly explain about Excitation System Stabilizer (ESS).
(f) Compare Tandem compound steam turbine systems with Cross compound systems.
(g) Explain stability of relative motion.
(h) What is voltage stability?
(i) What are the different ways of improving transient stability?
(j) Define “Stabilizer gain”.

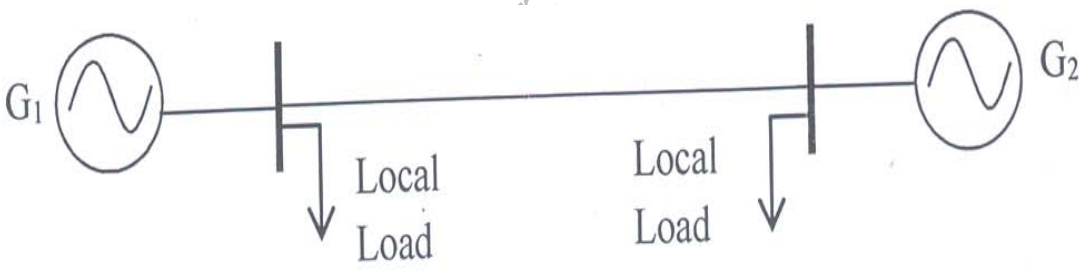
PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

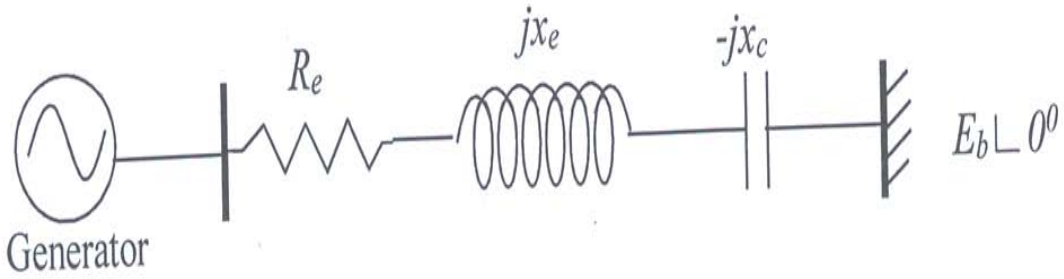
2 (a) Explain about the direct method to check the stability of single machine infinite bus (SMIB) system that does not require the solution of the swing equation following disturbance. Give your remarks.

(b) Transform a two machine system shown in figure below to an equivalent single machine system.



OR

3 Find the level of series compensation that will maximize the received power in a single machine system shown below figure. The generator impedance is assumed to be $Z_g = R_g + jx_g$. Assume $E_g = E_b = 1.0, R_e = 0.1, x_e = 1.0, x_g = 0.1, R_g = 0.0$.



Contd. in page2

Code: 15A02802 **R15**

UNIT – II

4 Transform the stator voltage equations and torque equations from 'abc' frame of reference to 'dqo' reference frame.

OR

5 Starting from the flux linkage equations derive the voltage and torque equations of synchronous machine.

UNIT – III

6 Draw the functional block diagram of excitation system and explain about different elements of excitation system in detail. Also explain various control and protective schemes of excitation system.

OR

7 Derive the transfer function for hydraulic turbine and explain about the special characteristics of hydraulic turbine.

UNIT – IV

8 Using small signal analysis obtain the characteristic equation of a synchronous machine equipped with an AVR of gain 'ke' and single time constant 'Te' connected to infinite bus. Hence discuss the condition for stability.

OR

9 Draw the overall block diagram of single machine infinite bus system and obtain an approximate transfer function as a ratio of electrical torque and load angle.

UNIT – V

10 Explain in detail about the structure of Power System Stabilizer (PSS) using suitable block diagrams.

OR

11 What are contributions of high gain AVR and discuss the role of PSS in improving the dynamic performance of power system?

*****