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B.TECH
(SEM VII) THEORY EXAMINATION 2022-2023
POWER SYSTEM DYNAMICS AND CONTROL

Time: 3 Hours ***Total Marks: 100***

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

(a) What is the purpose of using damper windings in synchronous machines?
(b) Give the difference between transient and steady state stability
(c) What quantities we can transform using Park's transformations?
(d) What are the benefits of per unit quantities over actual values?
(e) What is critical clearing angle?
(f) What is short circuit ratio of alternator?
(g) Discuss the applications of RH criteria for power system stability.
(h) What is damping torque how it is produced?
(i) Discuss the function of washout circuit.
(j) What do you mean by power system stabilizers?

SECTION B

2. Attempt any *three* of the following: 10 x 3= 30

(a) Discuss in detail various states of operation for power system security.
(b) What are the various factors that must be kept in mind while selecting base for converting actual values in PU values for stator and rotor?
(c) Derive the expression for power transmitted by a generator having reactance Xg connected to an infinite bus bus bar through a parallel transmission line having reactance Xt (for each line) when one line gets fault and removed from service.
(d) Discuss the application of Routh-Hurwitz criterion for steady state stability to by the coefficients of the characteristic equation.
(e) Give the block diagram of power system stabilizer with speed input and explain all the components in detail.

SECTION C

3. Attempt any *one* part of the following: 10 x 1= 10

(a) What do you mean by critical clearing time, derive the expression for it?
(b) With the help of swing equation define equal area criteria.

4. Attempt any *one* part of the following: 10 x 1= 10

(a) What is Park's Transformation? Transform stator voltage equations using it.
(b) Draw the d-axis and q-axis equivalent circuit of synchronous machine also mention all the parameters.

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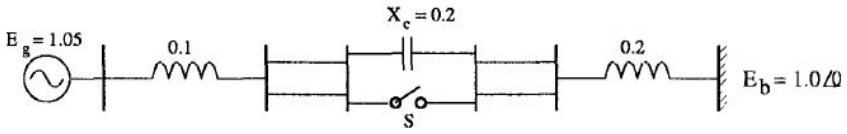
5. Attempt any *one* part of the following: 10 x 1= 10

(a) What do you mean by synchronizing power? Derive the expression for synchronizing power for salient pole synchronous generator.

(b) Consider the system shown in figure. The reactance of each line section is 0.8 and is compensated 50% by using series capacitors. Following a Fault in one of the sections, it is tripped. Neglecting the effect of the fault, compute the transient stability limit

(i) If the switch *S* remains closed.

(ii) If the switch *S* is opened as soon as the line is tripped.



6. Attempt any *one* part of the following: 10 x 1= 10

(a) How steady state stability can be improved by using SVC. Derive the expression for power when SVC is used in the middle of transmission line.

(b) What is the need of Automatic Voltage Regulator? Explain the various functions of AVR.

7. Attempt any *one* part of the following: 10 x 1= 10

(a) With the help of block diagram explain components of washout circuit in detail.

(b) What are the basic concepts in applying Power System Stabilizers? Explain the objectives of PSS for various system configurations.

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