Registration No:

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EEPC202/EYPE204

2nd Semester MTech Regular/ Back Examination-2014-15

POWER SYSTEM DYNAMICS

BRANCH(S):ELECTRICAL ENGINEERING(POWER ELECTRONICS,POWER ELECTRONICS & DRIVES, POWER ELECTRONICS & ELECTRICAL DRIVES ,ENERGY SYSTEM ENGINEERING)

Time: 3hours

Max. Marks: 70

SUBJECT CODE: T415/T425

Answer Question No.1 which is compulsory and any five from the rest.

The figures in the right hand margin indicate marks.

Q No.1 Answer the following questions. (2x10)

(a) What do you mean synchronous operation of a system?
(b) What are the various prime mover controls of a power system?
(c) Write down the assumptions used in Equal area criterion?
(d) What is eigen vector and why we need?
(e) what factor of a system state matrix depends upon small signal stability analysis of a power system?
(f) Draw the structure of a typical-lumped mass shaft system model.
(g) Define voltage stability & voltage collapse.
(h) What is participation factor of a power system?
(i) What do you mean rotor angle stability of a power system?
(j) Why we need state-space matrix analysis in case of a power system?

Q No.2 (a) Explain power system stability of a system. (5)

(b)Derive the critical clearing angle and critical clearing time of a single machine infinite bus system using Equal Area Criterion. (5)

Q No.3(a)Derive various matrices involved in state-space model of a dynamical System using linearization technique. (5)

(b)Explain synchronous machine characteristics of a two machine System with power angle curve and phasor diagram. (5)

Q No.4(a) Draw the generic block diagram of a power system stabilizer and

explain each block briefly. (5)

(b) Explain parametric effects of a Hop bifurcation in case of a small signal stability. (5)

Q No.5 A 50Hz, 4 pole turbo generator rated 100 MVA, 11kV has an inertia Constant of 8.0 MJ/MVA.

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

(b) If the mechanical input is suddenly raised to 80 MW for an electrical load of 50MW, find rotor acceleration, neglecting mechanical and electrical losses.

(c) If the acceleration calculated in part(b) is maintained for 10 cycles, find the change in torque angle and rotor speed in revolutions per minute at the end of this period. (10)

Q No.6(a) Explain the concept of Sub synchronous oscillations in a power system and develop the shaft system equations. (5)

(b)Explain in detail about Energy function of a single machine infinite bus system. (5)

Q No.7(a)Draw a neat sketch of speed governing system of a generator and Explain its functioning. (5)

(b) Explain ZIP model in details with basic load modeling of a system.(5)

Q No.8 Write short notes on any two. (5x2)

(a) Lyapunov's method.

(b) Counter measures to Sub Synchronous Resonance.

(c) AVR in Single Machine Infinite Bus (SMIB) system.

(d) Small signal stability analysis.