Registration No : | | | | | | | | | | |

Total Number of Pages : 02 **M.Tech**
PPPC202

2nd Semester Back Examination 2017-18
POWER SYSTEM DYNAMICS
BRANCH : POWER ELECTRO AND POWER SYSTEMS
Time : 3 Hours
Max Marks : 70
Q.CODE : C1184

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.
Answer all parts of a question at a place.

Q1 **Answer the following questions :** **(2 x 10)**

a) Draw the equal area criterion for SIMB case and show the prefault, faulted and post fault power angle curves P_e.
b) What is the necessity of Power System Stabilizer?
c) Draw the V_R- P_R characteristics of a system with different load factors related to voltage stability.
d) What is Lyapunov's method?
e) How do you classify different types of load based on voltage magnitude and load indices?
f) What are the sources contributing to the damping of torsional oscillation?
g) What are the different types of electromechanical oscillation?
h) Sketch the block diagram of a single-machine infinite bus system with classical generator model(block diagram only).
i) Define torsional stiffness (K). What is its significance?
j) Compare Mid-Term and long-Term stability.

Q2 **a)** Explain the torsional instability problems due to interaction with power system controls **(5)**
b) What are the sources contributing to the damping of torsional oscillations? **(5)**

Q3 What is sub synchronous resonance? Why it manly occurs in series capacitor –compensated transmission systems? Write the countermeasures to SSR problems. **(10)**

Q4 **a)** Define power system stability. Classify power system stability. **(5)**
b) Explain clearly Hopf bifurcation with a suitable example. **(5)**

Q5 **a)** How stability of a system is determined from Eigen values? **(5)**
b) Explain how torsional oscillation in sub synchronous range could be due to Torsional fatigue duty due to network switching. **(5)**

Q6 **a)** Write the step by step algorithm to study the effect of loading on small signal stability. **(5)**
b) Explain the design procedure of Power System Stabilizer using frequency domain method. **(5)**

Q7 Compute Eigen values and the participation matrix(P) of the following system matrix **(10)**

$$\begin{bmatrix} -0.4 & 0 & -0.01 \\ 1 & 0 & 0 \\ -1.4 & 9.8 & -0.02 \end{bmatrix}$$

Q8 **Write Short Notes (Any TWO) :** **(5 x 2)**

a) The energy function for single machine infinite bus system

b) Multi machine PEBS

c) Time domain simulations and direct stability analysis techniques