R11

Code : 1P6214

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET

(AUTONOMOUS)

M.Tech. I Semester Regular Examinations, February 2014

REACTIVE POWER COMPENSATION & MANAGEMENT

(Common to EPE & EPS)

Time: 3 hours **Max Marks: 60**

Answer any FIVE of the following

All questions carry equal marks (12 Marks each)

* * * * *

1. a) Describe the objectives of reactive power compensation.
   b) Explain how power factor correction is achieved for un-symmetrical loads.
2. a) Describe various methods of compensation.
   b) Differentiate between passive and dynamic compensation (shunt) with relevant diagrams
3. Explain transient state reactive power compensation in transmission system by using shunt and series compensation.
4. a) What do you understand from terms 'harmonics' and quality of power supply?
   b) Describe the effects of under voltage and over voltage in transmission system.
5. a) Explain various power tariffs.
   b) Describe KVAR based tariff's penalties for voltage flickers and harmonic voltage levels.
6. a) Explain loss reduction method in distribution side reactive power management.
   b) Explain the economical way to plan capacitor placement in distribution system for VAR management.
7. a) Draw the characteristics and list the limitations of user side reactive power management.
   b) Mention KVAR requirements for domestic appliances.
8. a) Discuss the various types of railway electric systems with neat diagrams.
   b) Mention the reactive power control requirements in the traction systems & arc furnaces.

***

R11

Code : 1P6215

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET

(AUTONOMOUS)

M.Tech. I Semester Regular Examinations, February 2014

SOFT COMPUTING TECHNIQUES

(Common to EPE & EPS)

Time: 3 hours **Max Marks: 60**

Answer any FIVE of the following

All questions carry equal marks (12 Marks each)

* * * * *

1. a) Describe the McCulloch-Pitts Neuron model. 6M

   b) Explain the structure and working of a neuron with the help of neat diagram. 6M

2. a) Explain different neuron activation functions. 6M

   b) List the different learning rules and explain one learning rule. 6M

3. a) Write the perceptron learning algorithm for a simple classification problem with n input features (X_1, X_2, ...X_n) and two output classes(0/1). 6M

   b) Write the limitations of the preceptron learning model. 6M

4. a) State and explain the generalized back propagation algorithm. 6M

   b) Explain about Radial basis function networks. 6M

5. a) Compare and contrast fuzzy and crisp sets. 6M

   b) Let x = {1, 2, 3 - - - - - 10} Determine the cardinalities and relative cardinalities of the following fuzzy sets.

   $\tilde{A}$ = {(2; 0:4); (3; 0:6); (4; 0:8); (5; 1:0); (6; 0:8); (7; 0:6); (8; 0:4)}

   $\tilde{B}$ = {(2; 0:4); (4; 0:8); (5; 1:0); (7; 0:6)} 6M

6. List the various defuzzification methods. Explain each of them in detail. 12M

7. a) Explain roulette wheel selection processes in Genetic algorithm. 6M

   b) Explain the following operators in the Genetic Algorithm

   i) Fitness function ii) Reproduction iii) Cross Over iv) Mutation 6M

8. a) Explain ANN based Short Load forecasting. 6M

   b) Explain Genetic Algorithm based Economic Load dispatch. 6M

***

Code : 1P7211

R11

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET

(AUTONOMOUS)

M.Tech. I Semester Regular Examinations, February 2014

SYSTEM THEORY

(EPS)

Time: 3 hours **Max Marks: 60**

Answer any FIVE of the following

All questions carry equal marks (12 Marks each)

* * * * *

1. Construct state model for a system characterized by the differential equation $\frac{d^3y}{dt^3} + 6\frac{d^2y}{dt^2} + 11\frac{dy}{dt} + 6y + 4 = 0$ give the block diagram representation of state model.
2. Describe the solutions of homogenous and non-homogeneous state equations.
3. Explain the general concept of controlability and observability with an example.
4. Compare the merits and demerits by using Lyuapunov stability criteria for assessing Linear Time Invariant (LTIV) system.
5. Determine the stability of the equilibrium point of the system defined by the equation $\dot{X} = \begin{bmatrix} 0 & 1 \\ -10x_1^2 & -1 \end{bmatrix} x$ using Lyuapunou method.
6. Write the controllable and observable comparison forms of the state model and determine the transformation matrix, P_0
7. Explain the design of reduced order state observer with neat diagram.
8. Consider the system shown in fig 1 assuming the control signal to be $u(t) = -Kx(t)$. Determine the optimal feedback gain matrix "K" such that the following performance index is minimized.

$$J = \int_0^\infty (X^T Q X + u^2)dt \ \ where\ Q = \begin{bmatrix} 1 & 0 \\ 0 & \mu \end{bmatrix} \ (\mu \geq 0)$$

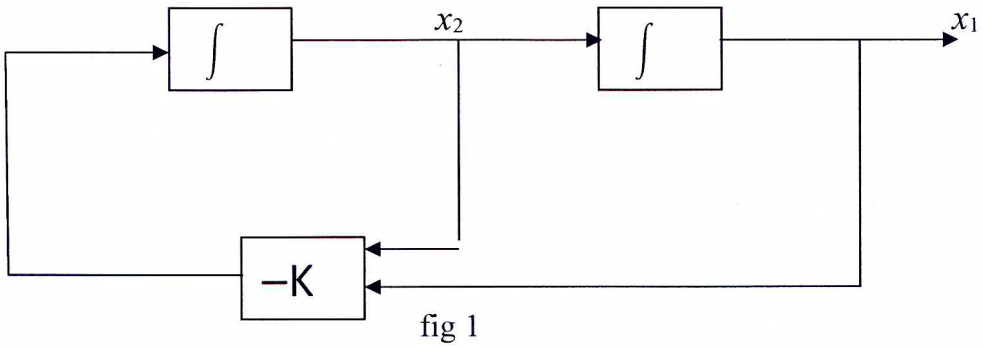


fig 1

****

Code : 1P6217

R11

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
(AUTONOMOUS)

M.Tech. I Semester Regular Examinations, February 2014

Advanced power system analysis

(Common to EPE & EPS)

Time: 3 hours **Max Marks: 60**

Answer any FIVE of the following
All questions carry equal marks (12 Marks each)

* * * * *

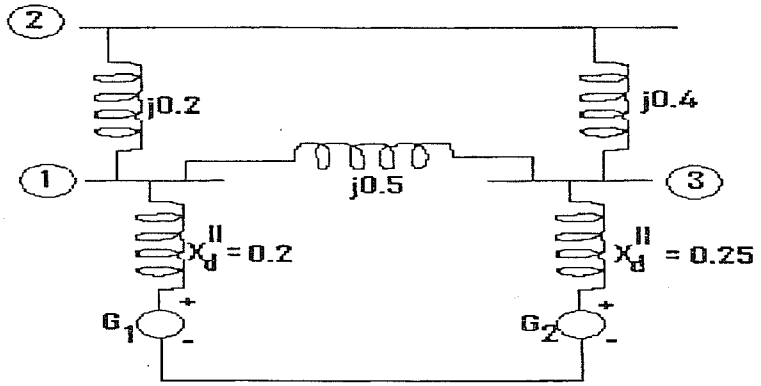
1. a) Explain the derivation of element pair admittance matrix from node-pair impedance matrix. 6M

   b) Derive the performance equation of a 3-phase balanced network in impedance and admittance form. 6M

2. Explain modeling of different types of tap-changing transformers for the purpose of load flow studies. 12M

3. Explain clearly the algorithmic steps for solving load flow equation using N-R method for polar form when the system contains all types of buses and draw the flow chart. 12M

4. For the network shown in figure, find the sub-transient current in per unit from generator1 and in line 1-2 and the voltages at buses 1 and 3 for a 3-phase fault on bus2. Assume that no current is flowing prior to the fault and the pre-fault voltage at bus2 is $1.0 < 0^0$ pu. Use bus impedance matrix in the calculations.



12M

5. Explain the step by step procedure for symmetrical fault analysis using bus impedance matrix. 12M

6. a) What is optimal power flow? What are the objectives of optimal power flow? 4M

   b) Explain the solution of optimal power flow using gradient method. 8M

7. Explain the algorithm for simulation of single machine infinite bus and multi machine system with classical synchronous machine model. 12M

8. a) What is power system security? Explain the factors affecting power system security? 6M

   b) Explain the methods of correcting the generation dispatch. 6M

***

R11

Code : 1P6213

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET

(AUTONOMOUS)

M.Tech. I Semester Regular Examinations, February 2014

EHV AC/DC TRANSMISSION

(Common to EPE & EPS)

Time: 3 hours **Max Marks: 60**

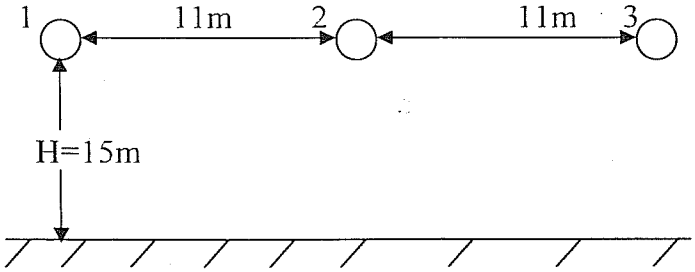
Answer any FIVE of the following

All questions carry equal marks (12 Marks each)

* * * * *

1. a) What is the necessity of EHVAC transmission system? Explain the advantages and problem with EHVAC transmission.

   b) Calculate the capacitance matrix of a 3 phase 400KV line shown in below figure conductor dia=6.36cm and B=45.72cm S=11m phase separation.



2. a) Define voltage gradients of conductors in EHV system. Also explain surface voltage gradient on conductors.

   b) A sphere gap with spheres having radii R=0.5m has a gap of 0.5m between their surfaces calculate

      i) The required chargers and their locations to make the potentials 100 and 0

      ii) The voltage gradient on the surface of high voltage sphere.

3. Calculate electrostatic field of EHV AC lines in the following situations.

   a) Single circuit 3 phase EHV lines

   b) Double circuit 3-phase EHV lines

4. a) Explain the generation of audible noise due to corona

   b) Discuss the characteristics and limits of this audible noise.

5. Discuss the economic advantages of HVDC transmission over EHVAC link for transmitting bulk powers from point to point based on insulation requirements and stability.

6. a) Explain the operation of cascaded two, 3 phase circuits for 6 pulse operation and obtain the expressions for the following.

   i) DC output voltage ii) RMS current of each secondary of the transformer

   iii) Volt-ampere rating of the transformer. iv) Peak inverse voltage

   b) Also compare the above values with that of a 3 phase, 6 pulse, graetz's circuit.

7. Give reasons for the presence of harmonics in HVDC systems. Also explain the process of harmonic elimination.

8. Explain the objective of DC power modulation in detail.

***

R11

Code : 1P6212

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET

(AUTONOMOUS)

M.Tech. I Semester Regular Examinations, February 2014

Power System Control & Stability

(Common to EPE & EPS)

Time: 3 hours **Max Marks: 60**

Answer any FIVE of the following

All questions carry equal marks (12 Marks each)

* * * * *

1. a) Obtain the classical model of single machine connected to an infinite bus.
   b) Discuss the effect of excitation system on Transient stability.
2. a) Explain the action of voltage regulator with one time log.
   b) Discuss the effects of oscillation of an unregulated multi machine system.
3. Explain the state space model of one machine system connected to infinite bus with respect to dynamic stability of a power system.
4. a) With a suitable example, explain the concept of lead compensation.
   b) Discuss the stability aspects of a power system using Eigen value approach.
5. a) Discuss in detail the differences between continuously regulated and non continuously regulated systems.
   b) Explain the encitation system compensation with suitable illustration.
6. Develop the state space modeling of type 3 encitation system with the help of block diagram.
7. a) Explain the concept of voltage instability.
   b) Discuss the physical relation indicating the dependence of voltage and reactive power flow.
8. a) What is the significance of PV and QV curves with respect to voltage stability?
   b) Explain the concept of continuation power flow analysis.

***