ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
(AUTONOMOUS)
M.Tech. I Semester Regular Examinations, April/May 2012
SOFT COMPUTING TECHNIQUES
(Common to EPE & EPS)
(For students admitted in 2011-12)

Time: 3 hours

Max Marks: 60

Answer any FIVE of the following
*All questions carry equal marks*

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1. a) Differentiate Artificial and Biological Neuron model.

   b) Explain about spiking neuron model and McCulloch-Pitts model.

2. a) Explain different types of activation functions.

   b) What is a learning rule? Explain different types of learning rules?

3. a) State and explain Perceptron convergence theorem.

   b) What are the limitations of Perceptron model?

4. Explain
   a) Back propagation learning rule.
   b) Radial basis function.

5. Define fuzzy sets. Explain properties, operations and relations of fuzzy sets.

6. a) What do you mean by fuzzification?

   b) Explain different methods of Defuzzification.

7. a) What are the advantages of using genetic algorithms over traditional methods?

   b) Explain with examples the following in genetic algorithm.
      i) Reproduction.
      ii) Crossover.
      iii) Mutation.

8. Explain the application of fuzzy logic to unit commitment problem with neat algorithm and flow chart.

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
(AUTONOMOUS)
M.Tech. I Semester Regular Examinations, April/May 2012
ADVANCED POWER SYSTEM ANALYSIS
(Common to EPE & EPS)
(For students admitted in 2011-12)

Time: 3 hours

Max Marks: 60

Answer any FIVE of the following
All questions carry equal marks

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1. Explain the algorithm for the formation of three phase bus impedance matrix for the addition of a branch. (12M)

2. Develop the load flow equations suitable for solving using fast decoupled method and draw the flow chart. (12M)

3. a) What is sparsity in matrices? Explain triangular factorization for solution of sparse network equations. (6M)
   b) Briefly explain the various schemes for optimal ordering. (6M)

4. Form the bus impedance matrix of the network shown in figure. The data for the network is given in table. (12M)
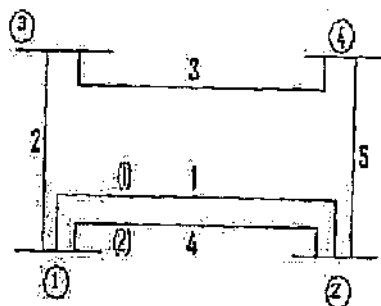
Element No	Self		Mutual	
	Bus Code	Impedance	Bus Code	Impedance
1	1–2(1)	0.6	—	—
2	1–2(2)	0.4	1–2(1)	0.2
3	1–3	0.5	1–2(1)	0.1
4	3–4	0.5	—	—
5	2–4	0.2	—	—

5. Derive the equations for the total fault current and bus voltage for the following faults through fault impedance Z_f (i) LLG fault (ii) L-L fault. (12M)

6. a) What is optimal power flow? Explain the problem in detail. (6M)
   b) Explain the solution of optimal power flow using Newton's method. (6M)

7. a) Explain the Euler and fourth order Runge-Kutta methods of Numerical Integration. (9M)
   b) What are the various factors influencing transient stability? (3M)

8. a) Derive the expression for the calculation of network sensitivity factor. (6M)
   b) What is state estimation? Explain how the state estimation is used in power system operation and control. (6M)

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
(AUTONOMOUS)
M.Tech. I Semester Regular Examinations, April/May 2012
MODERN CONTROL THEORY
(Electrical Power Engineering)
(For students admitted in 2011-12)

Time: 3 hours   Max Marks: 60

Answer any FIVE of the following
All questions carry equal marks

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1. a) Find the characteristic equation, Eigen values and Eigen Vectors for the

system: $A = \begin{bmatrix} 0 & 6 & -5 \\ 1 & 0 & 2 \\ 3 & 2 & 4 \end{bmatrix}$ [6M]

   b) Find the controllable canonical form for the system with state equation

$\dot{X}$=AX+BU. Where $A = \begin{bmatrix} 1 & 2 & 1 \\ 0 & 1 & 3 \\ 1 & 1 & 1 \end{bmatrix}$ and B= $\begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}$ [6M]

2. a) Obtain the solution of state equations for

      i) With input and   ii) Without input   [6M]

   b) Explain the different properties of State transition matrix.   [6M]

3. a) Find the complete State controllability and complete State observability of a

      system

$$\dot{X} = \begin{bmatrix} -2 & 1 & 0 \\ 0 & -2 & 0 \\ 0 & 0 & -3 \end{bmatrix} X + \begin{bmatrix} 0 \\ 4 \\ 5 \end{bmatrix} U \; ; \; Y = \begin{bmatrix} 0 \\ 4 \\ 5 \end{bmatrix}^T X$$

   using Jordan Canonical form.   [6M]

   b) Determine the similarity transformation matrix 'P' to transform the system

   $\dot{X} = AX + BU, Y = CX$ to the controllable canonical form, where

$A = \begin{bmatrix} -1 & 1 & 0 \\ 0 & -4 & 2 \\ 0 & 0 & -10 \end{bmatrix}, B = \begin{bmatrix} 1 & 0 & -1 \end{bmatrix}^T$ and $C = \begin{bmatrix} 1 & 0 & 1 \end{bmatrix}$.   [6M]

4. a) Explain in detail about various phenomena that occur in nonlinear systems. [6M]

   b) Explain the concept of describing function analysis of nonlinear systems. [6M]

5. Consider a system with an ideal relay as shown in figure(1). Determine the singular point, construct phase trajectories corresponding to initial conditions :
i)C(0)=2, $\dot{C}(0) = 1$ and ii) C(0)=2, $\dot{C}(0) = 1.5$. Take r=2V and M=1.2V. [12M]

fig(1).
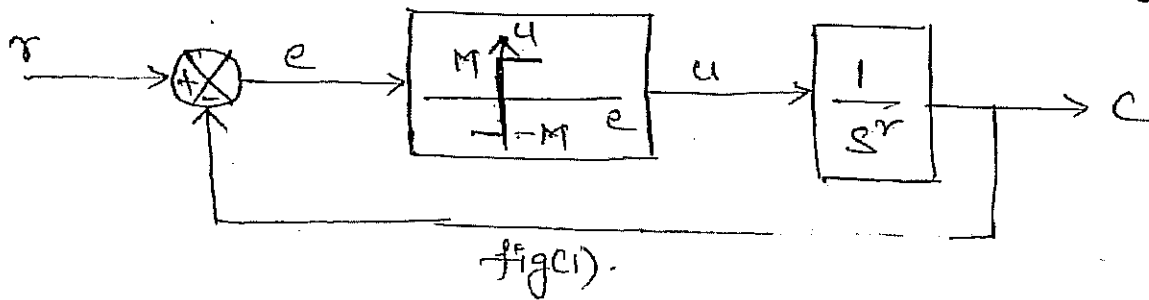
6. a) Determine the sign definiteness of the Quadratic function:

$$O = 10x_1^2 + 4x_2^2 + x_3^2 + 2x_2 x_1 - 2x_2x_3 - 4x_1x_3 \qquad [6M]$$

b) Consider the dynamics of the system represented by $\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -1 & -1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$

Formulate the Liapunov stability of the system. [6M]

7. Consider the system described by the state model: $\dot{X} = \begin{bmatrix} -1 & 1 \\ 1 & -2 \end{bmatrix} X$;

$Y = \begin{bmatrix} 1 & 0 \end{bmatrix} X$. Design a Full order state observer, the desired Eigen values for the observer matrix are $\mu_1 = -5, \mu_2 = -5$. [12M]

8. Explain in detail the concept of Linear Quadratic Regulator (LQR) problem. [12M]

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
(AUTONOMOUS)
M.Tech. I Semester Regular Examinations, April/May 2012
POWER SYSTEM CONTROL & STABILITY
(Common to EPE & EPS)
(For students admitted in 2011-12)

Time: 3 hours   Max Marks: 60

Answer any FIVE of the following
All questions carry equal marks

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1. a) Obtain the classical model of multi machine system.

   b) Discuss the effect of excitation system on Transient stability.

2. a) What is unregulated synchronous machine? Discuss in detail the effect of speed changes.

   b) Discuss in detail the governor action with one time lag of regulated synchronous machine.

3. Discuss in detail the concept of dynamic stability using Routh's Criterion.

4. a) Draw and explain the simplified model of Power system stabilizer installed in single machine connected to an infinite bus.

   b) Discuss the approximate model of the complete exciter-generator system.

5. a) With the help of a neat block diagram develop and explain the state space model of the excitation system.

   b) What are the effects of excitation on generator power limits?

6. a) With a suitable diagram explain rotating rectifier system.

   b) Compare the different types of excitation systems and give applications of each type.

7. a) With a neat diagram explain the function of Automatic Voltage regulator.

   b) What are the various factors affecting voltage instability and collapse.

8. Explain in detail the concepts of static and dynamic voltage stability Analysis.

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
(AUTONOMOUS)
M.Tech. I Semester Regular Examinations, April/May 2012
EHV AC/DC TRANSMISSION
(*Common to EPE & EPS*)
(For students admitted in 2011-12)

Time: 3 hours   Max Marks: 60

Answer any FIVE of the following
All questions carry equal marks

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1. a) What is a bundled conductor? Show that the equivalent radius of a bundled

   conductor is $req = R \left[\frac{N.r}{R} \right]^{1/N}$ *Where R is radius of bundle,*

   r is radius of sub conductor,

   N number of conductors in the bundle

   b) The configurations of some EHV lines for 400 KV to 1200KV are given.
   Calculate req for each.

   i) 400 KV   : N=2, d=3.18cm, B=45cm

   ii) 750 KV   : N=4, d=3.46cm, B=45cm

   iii) 1000 KV : N=6, d=4.6cm, B=12d

   iv) 1200 KV : N=8, d=4.6cm, B=60cm

2. a) What are the effects of high electrostatic fields on biological organisms
   and human beings?

   b) Show that the variation of surface voltage gradient on the periphery of a
   sub-conductor of bundle conductor follows Cosine law.

3. Explain the following.

   a) Series and shunt compensation of EHV AC lines.

   b) Static VAR compensators for reactive power control in EHV systems.

4. a) Explain the attenuation of travelling waves due to corona loss.

   b) List the Corona loss formulae.

5. a) Explain the parameters taken into consideration for planning of HVDC
   transmission.

   b) Compare the power transfer capacities of AC and DC, when an existing
   AC line is converted into DC line with the following conditions

   i) Same current and insulating level.

   ii) Same percentage losses and insulating level.

6. a) Draw 12 pulse converter station circuit diagram and explain each component of it.

   b) Write short notes on equivalent circuits of rectifier and inverter.

7. a) What is the purpose of filters in HVDC systems?

   b) Explain the limitations of constant extinction (β) angle control of inverter operation when there is a sudden reduction in system voltage.

8. a) Explain the over voltages due to disturbances on AC system side.

   b) Explain the harmonic instability problems due to the interaction between HVAC and DC systems.

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
(AUTONOMOUS)
M.Tech. I Semester Regular Examinations, April/May 2012
REACTIVE POWER COMPENSATION AND MANAGEMENT
(Common to EPE & EPS)
(For students admitted in 2011-12)

Time: 3 hours

Max Marks: 60

Answer any FIVE of the following
All questions carry equal marks

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1. a) Describe how load compensator acts as voltage regulator.

   b) Explain how phase balancing is achieved for unsymmetrical loads.

2. a) Differentiate between passive and active compensations.

   b) Describe the operation of dynamic shunt compensation applied to transmission system.

3. a) Describe with relevant diagrams, transient state reactive power compensation in transmission by using series compensation.

   b) Explain the phenomenon of compensation using synchronous condensers.

4. a) What do you understand from the term '*quality*' of power supply?

   b) Describe the effects of under voltage and over voltage in transmission system.

5. a) Explain the demand side management load shaping.

   b) Describe KVAR based power tariffs.

6. a) Explain the objectives of reactive power planning in distribution systems.

   b) List the various loss reduction methods and explain any one of them in detail.

7. a) Mention KVAR requirements for domestic appliances.

   b) Describe the methods to select the capacitor for compensation.

8. a) Draw a typical layout of traction systems.

   b) Describe the role of transformer in arc furnace with neat diagram.

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