Code No: 1P6215 **R11**

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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Code No: 1P6217 **R11**

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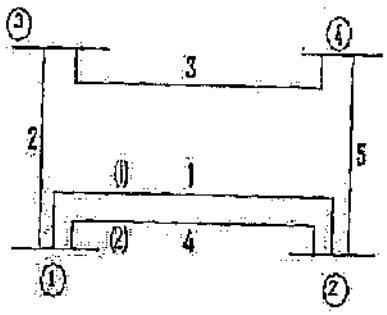
1. Explain the algorithm for the formation of three phase bus impedance matrix for the addition of a branch. (12M)

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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Code No: 1P7211 **R11**

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

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

Answer any FIVE of the following
All questions carry equal marks

* * * * *

1. Determine the state model of armature controlled DC motor and draw block diagram.
2. a) Define state transition matrix.
   b) Compute state transition matrix e^{AT} of the matrix $A = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix}$
3. Write the state equations for the system shown in figure-1, in which X_1, X_2, X_3 constitute the state vectors. Determine whether the system is completely controllable and observable.

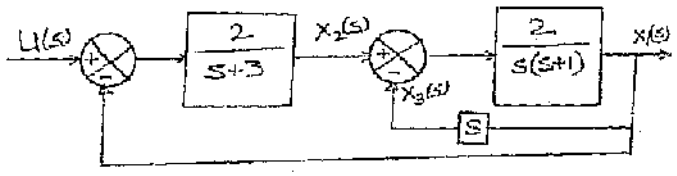

Fig. 1.

4. Asses the BIBO stability and Asymptotic stability of the system whose sate equation is given by $X = \begin{bmatrix} 0 & -1 \\ 1 & -3 \end{bmatrix} x + \begin{bmatrix} 1 \\ 1 \end{bmatrix} u \; ; \quad Y = [0 \quad 1]x$
5. Explain the method of constructing Lyapunov function by Krasovskii and Variable gradient methods for non-linear systems.
6. Prove the following statement using an example of your own.
   a) Controllability is preserved by State feedback.
   b) In a controllable and unobservable system, there is always a fixed mode by output feedback.
7. Explain the design of Full order state observer with neat diagrams.
8. Consider the system shown in figure-2. Assuming the control signal to be $u(t) = -KX(t)$. Determine the optimal feed back gain matrix 'K' such that the following performance index is minimized.

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

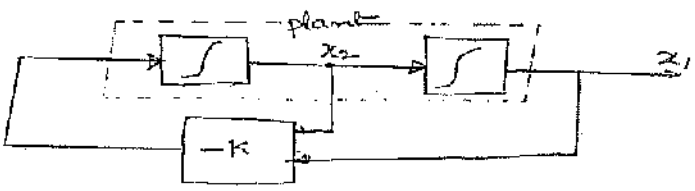

Fig. 2

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Code No: 1P6212 **R11**

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

* * * * *

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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Code No: 1P6213 **R11**

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

* * * * *

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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Code No: 1P6214

R11

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

* * * * *

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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