Code : 1P6217

R-11

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

M.Tech. I Semester Regular/Supplementary Examinations April - 2013

ADVANCED POWER SYSTEM ANALYSIS
(EPE & EPS)

Max. Marks: 60 **Time: 03 Hours**

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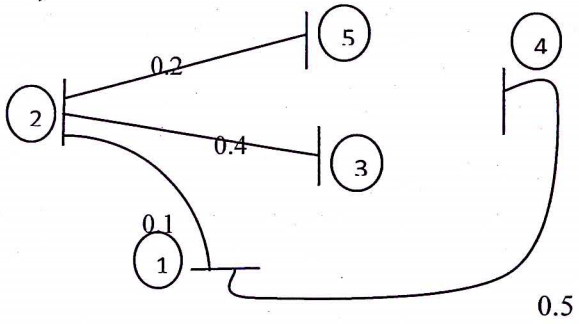
Answer *any five* questions
All Questions carry equal marks (12 Marks each)

1. Find the bus impedance matrix for the network shown in fig-1 all values of reactances are in P.U(neglect resistances).Take bus-1 as reference



12M

2. Explain how sparsity techniques are applied regarding optimal loading & tap changing transformers 12M
3. Explain clearly Newtorn-Rephson method of Load flow analysis using Y_{bus} & relevant equations. 12M
4. Derive the equations for fault current & bus voltages in terms of symmetrical components for any type of fault 12M
5. Using sequence networks for a line to line fault(LL) explain the method of Thevenen's equivalent and derive necessary equations . 12M
6. a) What is an optimal power flow .Explain the problem in detail 4M
   b) Explain linear programming method for optimal power flow 8M
7. a) Explain what is transient stability problem 4M
   b) Explain the IVth order Rengekutta method of solution of transient stability 8M
8. a) Explain the factors affecting power system security 4M
   b) Explain the contingency analysis using the network sensitivity method 8M

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Code : 1P6213

R-11

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

M.Tech. I Semester Regular/Supplementary Examinations April - 2013

EHV AC/DC Transmission
(EPE & EPS)

Max. Marks: 60 **Time: 03 Hours**

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Answer *any five* questions
All Questions carry equal marks (12 Marks each)

1. a) What is a bundled conductor? What are the advantages of bundled conductors?
   b) Write short notes on positive, Negative and zero sequence impedances corresponding to E.H.V. lines.
2. Derive the expression for total electrostatic field component of 3-phase single circuit line.
3. What are the causes of over voltages in EHV A.C. lines? How do you suppress them? Explain in detail.
4. List out the available corona loss formula and discuss the attenuation of travelling waves due to corona?
5. a) Draw a schematic diagram of a typical HVDC converter station and explain the functions of various components available.
   b) Compare AC and DC transmission system based on technical and economical aspects.
6. a) Draw a Schematic of a 6 pulse converter circuit and derive from fundamentals, the expression for voltage with relevant waveforms.
   b) What are the advantages of Graetz's Circuit over other six pulse converters?
7. a) Why are harmonics generated in HVDC converter? Discuss about the different harmonics generated on both AC and DC sides of a 6 pulse converter.
   b) What are the various methods of converter controls? Explain with neat diagrams the working principle of constant current control.
8. a) What are various harmonic instability problems in HVAC and HVDC interaction?
   b) Explain voltage interaction between AC/DC systems.

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Code : 1P6211

R-11

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

M.Tech I Semester Regular Examinations April/May 2013

Modern Control Theory

(EPS)

Max. Marks: 60 **Time: 03 Hours**

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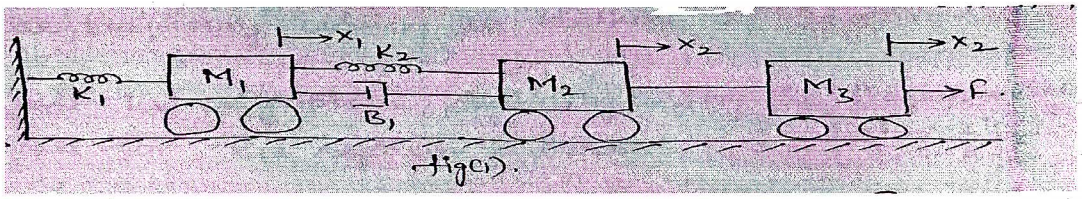
Answer *any five* questions
All Questions carry equal marks (12 Marks each)

1. Obtain the state model of the following system shown in fig(1).



12M

2. a) Compute e^{AT} for the system, $A = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix}$. 6M

   b) The state equations of a system are not unique. Explain. 6M

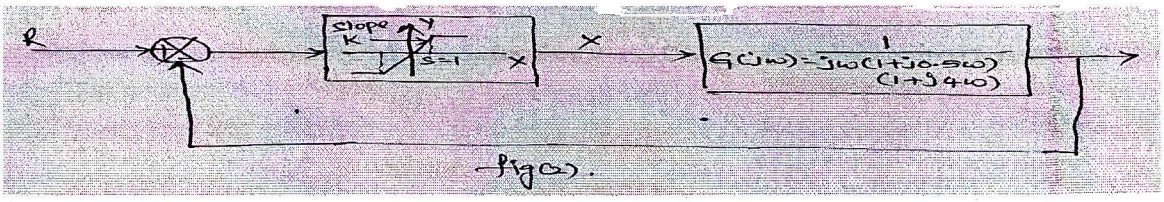
3. a) Determine the controllability and observability of the system given by,

$$\dot{X} = \begin{bmatrix} -1 & 1 & 0 \\ 0 & -4 & 2 \\ 0 & 0 & -10 \end{bmatrix} X + \begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix} u, \quad Y = [1 \quad 0 \quad 1]\, X$$

   6M

   b) Explain the concept of duality between controllability and observability. 6M

4. Consider a unity feedback system shown in fig(2) having a staturating amplifier with gain 'K'. determine the maximum value of 'K' for the system to stay stable. What would be the frequency and nature of limit cycle for a gain of K=2.5?



12M

5. A linear second order servo is described by the equation: $\ddot{e} + 2\xi\omega_n e = 0$. where , $\xi = 0.15, \omega_n = 1\frac{rad}{sec}, e(0) = 1.5$and $\dot{e}$ (0)=0. Determine the singular point. Construct the phase trajectory using the method of isoclines. 12M

6. a) Test the asymptotic stability using the Liapunov second method for the system dynamics :

$$\dot{X} = \begin{bmatrix} -1 & -2 \\ 1 & -4 \end{bmatrix} X$$

   6M

   b) Determine the range of value of 'K' by applying the Liapunov's second method for the system dynamics :

$$\dot{x}_1 = x_2 \ , \quad x_2 = -\dot{x}_2 + x_3, \quad \dot{x}_3 = -\dot{K}x_1 - 4x_3$$

   6M

7 Consider the system $\dot{x} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -1 & -5 & -6 \end{bmatrix} x + \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix} U$. By using state feedback control $u = -Kx$, it is desired to have the closed loop Poles at $S = -2 \pm j4$ and S=-10. Determine the state feed back gain matrix 'K'. 12M

8. Write short notes on

a) Fundamental theorem of calculus of variations.

b) Optimal control formulation using Hamiltonian method. 12M

Code : 1P6212

R-11

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

M.Tech. I Semester Regular/Supplementary Examinations April - 2013

POWER SYSTEM CONTROL & STABILITY
(EPE & EPS)

Max. Marks: 60 **Time: 03 Hours**

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Answer *any five* questions
All Questions carry equal marks (12 Marks each)

1. a) Obtain the classical model of multi machine system. 06M

   b) A generator is synchronized to an infinite bus. The field excitation is 1000 A (actual) at synchronization. $V_\alpha = 1.0$ and is the reference vector. $X_s = 1.5$. With I_f unchanged, the steam valves at the turbine are adjusted until $P_g = 0.2$. 06M

   (i) Find I_a (ii) With P_g unchanged and I_f increased to 1600 A(actual), find I_a

2. a) What is un regulated synchronous machine. Explain the effects of synchronous machine with small changes of speed. 06M

   b) Explain the working of Governor with one time lag. 06M

3. a) What is dynamic stability and discuss the effect of excitation on dynamic stability. 06M

   b) Obtain the state space model of one machine connected to infinite bus. 06M

4. a) What are the factors to be considered for design of complete exciter? 06M

   b) Obtain the simplified model of power system stabilizer installed in a single machine connected to an infinite bus. 06M

5. a) Discuss the effects of excitation on generator power limits. 06M

   b) Classify the different excitation systems and discuss them in detail. 06M

6. a) Discuss the various merits and demerits of different types of excitation systems. 06M

   b) Develop the state space modeling equations of Type 2 excitation system. 06M

7. a) Discuss the various factors affecting the voltage instability. 06M

   b) Obtain the physical relation indicating the dependence of voltage and reactive power flow. 06M

8. a) Distinguish the importance of PV and QV curves in voltage stability analysis. 06M

   b) Discuss the various factors to be considered for prevention of voltage collapse. 06M

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Code : 1P6214 **R-11**

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

M.Tech. I Semester Regular/Supplementary Examinations April – 2013

REACTIVE POWER COMPENSATION & MANAGEMENT
(EPE & EPS)

Max. Marks: 60 **Time: 03 Hours**

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Answer *any five* questions
All Questions carry equal marks (12 Marks each)

1.	a)	Explain the approximation of inductive and capacitor biasing.	**6M**
	b)	Explain phase balancing and power factor correction of unbalanced loads.	**6M**
2.		Discuss about steady state passive shunt compensation and dynamic compensation.	**12M**
3.		What are the different types of static compensation and Explain static series compensation?	**12M**
4.		What is Reactive power planning? What are the transmission benefits when reactive power dispatching strategy is applied to improve power system operation?	**12M**
5.	a)	Explain the basic methods of load shaping.	**6M**
	b)	Discuss about KVAR based power tariff and penalties for voltage flicker and harmonics.	**6M**
6.	a)	Explain the economic justification for capacitor placement.	**8M**
	b)	Write about retrofitting of capacitor bank.	**4M**
7.	a)	Explain different types of capacitors with characteristics and limitations.	**8M**
	b)	Write the purpose of using the capacitors in distribution systems.	**4M**
8.	a)	Discuss the power factor of an arc furnace in detail.	**6M**
	b)	Write about different layouts of electric traction systems.	**6M**

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Code : 1P6215

R-11

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

M.Tech I Semester Regular Examinations April/May 2013

Soft Computing Techniques
(EPE & EPS)

Max. Marks: 60 **Time: 03 Hours**

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Answer *any five* questions
All Questions carry equal marks (12 Marks each)

1. a) Explain Hodgkin-Huxley neuron model and Integrate-fire model.
   b) Explain characteristics of ANN.
2. a) Explain different learning strategies.
   b) Write short note on architecture of ANN.
3. a) Explain single layer perceptron model with neat architecture and algorithm.
   b) State limitations of Perceptron model.
4. Explain different types of supervised learning networks.
5. Explain the following.
   a) Fuzzy relations.
   b) Membership functions.
   c) Fuzzy operations.
   d) Fuzzy sets.
6. a) Explain rules base and decision making system in Fuzzy system.
   b) Write short note on De-fuzzification methods.
7. Explain the following operation in genetic algorithms with examples.
   a) Crossover
   b) Mutation
   c) Reproduction.
8. Explain the application of ANN for short term and long term load forecasting with neat algorithm and flowchart.

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