

Total No. of Pages 1

Roll No.

EIGHTH SEMESTER

B.E. (EE)

MID SEM EXAMINATION

March 2007

EE-411 POWER SYSTEM STABILITY

Time: 1 Hour 30 Minutes

Max. Marks : 20

Note : Answer ALL questions.

Assume suitable missing data, if any.

- 1[a] What do you mean by reactive power injection? How would you determine the reactive power requirement of a line? 3
- [b] A 3-phase long line has constants $A = 0.98 \angle 3^\circ$ and $B = 110 \angle 75^\circ$ ohm/ph. (a) If load is 50 MVA 0.8 pf lagging. Find the capacity of shunt compensation equipment. If voltages at the two ends of the line are 132 kV each (b) find the capacity of shunt compensation equipment if the voltages at the two ends are to be maintained at 132 kV under no load conditions. 4
- 2[a] What do you mean by stability of an electric power system? Distinguish between steady state, dynamic and transient stability. 3
- [b] A 50 Hz generator of reactance 1 pu is connected to an infinite bus through a line of reactance 0.6 p.u. $E = 1.2$ p.u and $V = 1$ p.u. The inertia constant is 5.2 MW-sec/MVA. The generator is loaded to 50% of the maximum power limit. Find the frequency of natural oscillations. 4
- 3[a] Derive swing equation starting from the first principle. Define inertia constant. 3
- [b] Discuss the equal area criterion for studying the transient stability of a power system. 3

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EIGHTH SEMESTER

B.E. (EE)

MID SEM EXAMINATION

March

2007

EE-412 CONTROL SYSTEMS

Time: 1 Hour 30 Minutes

Max. Marks : 20

Note : Answer ALL questions.

Assume suitable missing data, if any.

- 1 Define "State variables" precisely. Give the general form of the state model for a dynamic system. From the general form of the state model construct the quantitative state variable model for LTI system. Also, draw the block diagram of the model. 4
- 2 Develop a suitable state-space model for the linear time invariant circuit shown in Fig.1. 5

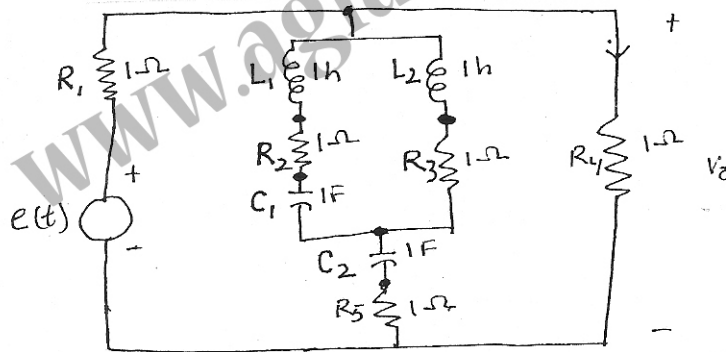


Fig. 1

- 3 For a LTI system described by the following differential equation obtain a suitable state variable model. Also, draw the block diagram of the state model.

$$\ddot{y} + 6\dot{y} + 11y = \ddot{u} + 8\dot{u} + 17u + 8u$$

3

- 4 Construct a state model for the system described by the following transfer function in Jordan Canonical form

$$T(s) = \frac{2s^2 + 6s + 5}{(s+1)^2(s+3)}$$

Also indicate the Jordan block in the "A" matrix.

3

- 5 A linear time-invariant system is describe by the differential equation

$$\frac{d^3 y}{dt^3} + 3 \frac{d^2 y}{dt^2} + 3 \frac{dy}{dt} + y(t) = r(t)$$

with the initial conditions $y(0) = 1$,

$$\frac{dy}{dt}(0) = 0 \quad \& \quad \frac{d^2 y}{dt^2}(0) = 0.$$

Using the concept of state variables, obtain the step response of the system.

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EIGHTH SEMESTER

B.E. (EE)

MID SEM EXAMINATION

March 2007

EE-413 HIGH VOLTAGE ENGINEERING

Time: 1 Hour 30 Minutes

Max. Marks : 20

Note : Answer ALL questions.

Assume suitable missing data, if any.

- 1 Explain briefly.
 - [a] Impulse breakdown voltage is higher than power frequency breakdown voltage for a gaseous gap subjected to a uniform field. 2
 - [b] A three stage cascaded transformer will have a higher short circuit impedance as compared to a single unit. 2
 - [c] Electrons are the good ionisers of gas while ions are not. 2
- 2 Explain the physical significance of the Townsend's criterion for breakdown. 3
- 3 Explain how a sphere gap is used to measure the peak value of voltages. What precautions need to be taken? 4
- 4 A eight-stage Cockraft-Walton type cascade circuit with capacitance all equal to $0.05\mu\text{F}$ is fed from 150 kV. If 3.5 mA of current is to be supplied to the load by this circuit, determine (i) the ripple (ii) the voltage drop and regulation . The frequency of the supply is 150 Hz. 3
- 5 Give the constructional details of a multi-stage impulse generator. Why is controlled triggering required in an impulse generator. 4