(1) BE-sem-VII - old - Electrical - PSOC

19/5/17

Q.P. Code : 626602

(3 Hours) **[Total Marks : 100**

Note: Question No. **1** is compulsory.
Solve any **FOUR** questions out of remaining.
Assume suitable data if required and mention the same.

Q No 1 Solve the following questions **20**

a> What are various assumptions in load flow study

b> Define the term regulation constant, control area

c> Define the term dynamic stability, steady state stability.

d> Define the term Heat rate and IFC curve.

Q No 2a Write the flow chart for NR method. **10**

Q No 2b The data for load flow solution of four bus system is as **10**

Line Code	Admittance
1-2	2-j 8.0
1-3	1-j 4.0
2-3	0.66-j 2.66
2-4	1-j 4.0
3-4	2-j 8.0

The schedule of active and reactive power is

Bus Code	P	Q	V	Remark
1	---	--	1.06	Slack Bus
2	0.5	0.2	1+j 0.0	PQ Bus
3	0.4	0.3	1+j 0.0	PQ Bus
4	0.3	0.1	1+j 0.0	PQ Bus

Determine the voltages at the end of first iteration using gauss Seidel method. Take $\alpha = 1.4$.

Q No 3a Discuss the implementation of AGC in restructured power system. **10**

Q No 3b A generator operating at 50 Hz delivers 1 pu power to a infinite bus through a transmission circuit in which resistance is ignored. A fault takes place reducing the maximum power transferable to 0.5 pu whereas before the fault, this power was 2.0 pu and after the clearance of fault it is 1.5 pu. By the use of equal area criterion determine the critical clearing angle. **10**

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Q No 4a State the various assumptions in deriving the power angle equation and derive the same. **10**

Q No 4b Two generators rated 200 and 400 MW are operating in parallel. The droop characteristics of their governors are 4% and 5% respectively from no load to full load. Assuming those generators are operating at 50 Hz at no load how a load of 600 would MW is shared between two units. What will be the system frequency at this load? If load is now suddenly reduced to 400 MW what will be new system frequency and load shared by each unit at this load. Assume the free governor action. **10**

Q No 5a Derive the equation for transmission loss by B coefficient **10**

Q No 5b Discuss the concept of power poll in detail. **10**

Q No 6a In a two bus system shown below if a load of 125 MW is transmitted from a plant no 1 to the load a loss of 15.625 MW is incurred. Determine the generation schedule and the load demand if the cost of received power is Rs 24/MWhr. The incremental production cost of the pants is **10**

$dF_1 / dP_1 = 0.025P_1 + 15$ and $dF2 / dP_2 = 0.05P_2 + 20$

Q No 6b Discuss the various factors affecting the transient stability **10**

Q No 7a Discuss the various sensitivity factors **10**

Q No 7b A two pole, 50 Hz, 11KV turbo generator has rating of 60 MW and power factor of 0.85 lagging. Its rotor has moment of inertia of 8800 Kg-m^2. Find its inertia constant in MJ/MVA and momentum in MJs/elect deg. **10**

BE-sem-VII – Electrical – OLD

7/6/17

Q.P. Code : 627201

(3 Hours) **[Total Marks : 100**

N.B. : (1) Question No: **1** is **compulsory**.
(2) Answer any **four** from the remaining **six** questions.
(3) **Figures** to the right indicate **full** marks.
(4) Assumptions made should be clearly stated.
(5) Assume any suitable data wherever required but justify the same.
(6) Answers to questions should be grouped and written together.

1. (a) Describe with neat diagrams the mode stabilization. **5**
   (b) Describe the stopping sequence of HVDC links. **5**
   (c) What is the significance of current margin? **5**
   (d) Draw the block diagram to show the system control Hierarchy in HVDC and mention the major components. **5**

2. (a) Develop the complete equivalent circuit of HVDC rectifier and draw the output voltage waveform. **14**
   (b) Derive the major relations of multiple bridge converter **6**

3. (a) With neat diagram explain HVDC components. **10**
   (b) Describe with neat diagrams the single commutation failure of converters. **10**

4. (a) Explain the transfer of current to bypass valve in rectifier and inverter operation. **10**
   (b) What are the causes of over voltages in HVDC and how the system is protected? **10**

5. (a) Explain control characteristics of HVDC system under normal and abnormal conditions. **10**
   (b) Explain the equidistant pulse generation schemes used in HVDC system. What are the advantages and disadvantages **10**

6. (a) Describe the causes and effect of harmonics in HVDC system **10**
   (b) "Converter consumes reactive power" Justify the statement. **10**

7. Write short notes on any **two** **20**
   (a) Comparison of AC and DC transmission.
   (b) HVDC links
   (c) Ground return

1/6/17

QP Code : 627102

(1)

(3 Hours) **[Total Marks : 100**

N.B. : (1) Question no. 1 is compulsory
(2) Answer any Four from remaining six.
(3) Assume data where ever needed.

1. Solve : **20**
   (a) From the Bode diagram viewpoint, briefly explain how a lead network increases the speed of the transient response.
   (b) What is the meaning of controllability? Under what conditions can inspection of the signal-flow graph of a system yield immediate determination of controllability?
   (c) Explain the region for stability on the z-plane?
   (d) Explain series and parallel form of PID Controller.

2. (a) (i) Write specifications of PLC and give at least three examples of industrial PLCs. **10**
   (ii) List and explain various the memory sections of PLC. **10**
   (b) Draw the block diagram of PLC and list and draw the symbols of input field devices used in PLC. Also explain the analog input module in details.

3. (a) Find the closed-loop transfer function, T(z) = C(z)/R(z), for the system shown in Figure 1 **10**

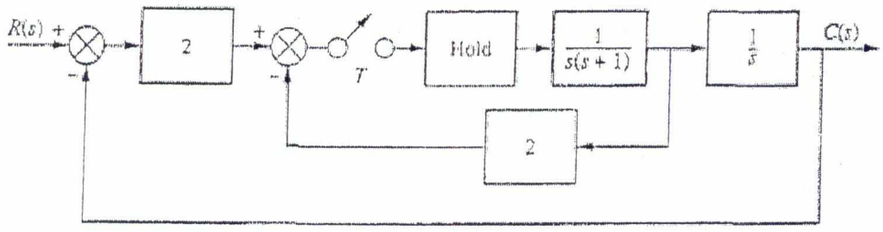

Figure 1 Q 3(a)

   (b) For step, ramp, and parabolic inputs, find the steady-state error for the feedback control system shown in Figure 2 for T = 0.1 second **10**

$$G_1(s) = \frac{20(s+3)}{(s+4)(s+5)}$$

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QP Code : 627102

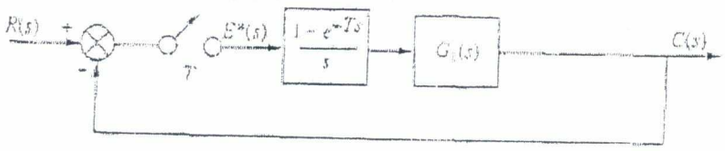

Figure 2 Q 3(b)

4. (a) Determine the range of sampling interval, T that will make the system shown in Figure 3 stable. 10

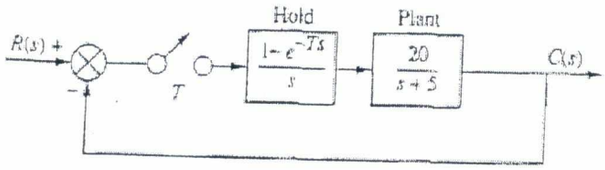

Figure 3 Q 4(a)

(b) Explain the addressing techniques used in PLC 10

5. (a) Design an observer for the plant operating with 10% overshoot and 2 seconds peak time. Design the observer to respond 10 times as fast as the plant. Place the observer third pole 20 times as far from the imaginary axis as the observer dominant poles. Assume the plant is represented in observer canonical form. 10

$$G(s)=\frac{10}{(s+3)(s+7)(s+15)}$$

(b) Given the following open-loop plant 10

$$G(s)=\frac{20(s+2)}{s(s+5)(s+7)}$$

design a controller to yield a 10% overshoot and a settling time of 2 seconds. Place the third pole 10 times as far from the imaginary axis as the dominant pole pair. Use the phase variables for state-variable feedback.

[TURN OVER]

QP Code : 627102

6 (a) The unity feedback system with 15

$$G(s) = \frac{K}{(s+2)(s+5)(s+7)}$$

is operating with 15% overshoot. Using frequency response methods, design a compensator to yield a five-fold improvement in steady-state error without appreciably changing the transient response.

(b) Explain the design procedure for lag- lead compensator using frequency response methods. 05

7. Write short note on **any TWO** : 20
   (a) Timer instructions in PLC
   (b) Counter instructions of PLC
   (c) Issues in implementing PID controller and its solutions.
