Code No: C5301 **R09**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH I SEMESTER EXAMINATIONS, APRIL/MAY 2012
POWER SYSTEM OPERATION AND CONTROL
(POWER SYSTEM CONTROL AND AUTOMATION)

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

Answer any five questions
All questions carry equal marks

\- - -

1.a) State the unit commitment problem? Explain the different types of constraints considered in the unit commitment problem?

b) Solve the following UC problem using priority list method for a system load 600MW

Unit No.	Min	Max	H1
1	100	500	$500 + 7P_1 + 0.0015P_1 * P_1\ MBtu/h$
2	110	350	$300 + 8P_1 + 0.002P_2 * P_2\ MBtu/h$
3	75	225	$100 + 8P_1 + 0.005P_3 * P_3\ MBtu/h$

2.a) What are the advantages of DP method for UC problem over priority list method? Explain forward and backward DP approaches along with the flow charts?

b) Explain unit commitment problem solution methods.

3.a) Explain about load frequency control in single area case?

b) Two generators rated 300 MW and 500 MW are operating parallel. The droop characteristics of their governors are 4% and 5% respectively from no load to full load. Assuming that generators are operating at 50 HZ at no load.
(i) How would a load of 800 MW be shared between them?
(ii) What will be the system frequency at this load? Assume free governor operation?

4.a) Explain load frequency control of TWO AREA power system in controlled case?

b) A two-area system connected by a tie-line has the following parameters on a 1000 MVA common base.

Area	1	2
Speed regulation	$R_1 = 0.05$	$R_2 = 0.0625$
Frequency-sens. Load coeff.	$D_1 = 0.6$	$D_2 = 0.9$
Inertia constant	$H_1 = 5$	$H_2 = 4$
Base power	1000 MVA	1000 MVA
Governor time constant	$\tau_{g1} = 0.2\ sec$	$\tau_{g2} = 0.3\ sec$
Turbine time constant	$\tau_{T1} = 0.5\ sec$	$\tau_{T2} = 0.6\ sec$

Contd….2

The units are operating in parallel at the nominal frequency of 60 HZ. The synchronizing power coefficient is computed from the initial operating condition and is given to the $P_s = 2.0\ P.U$.

A load change of 187.5 MW occurs in Area 1

i) Determine the new steady state frequency?

ii) Calculate change in the tie-line flow?

5.a) Explain about composite generation cost function with flow chart.

b) Write about performance index and optimal parameter adjustment.

6.a) Explain about inter change evaluation with unit commitment.

b) Write about other types of interchange.

7.a) Explain load frequency control and economic dispatch control.

b) A single area consists of two generating units with the following characteristics.

Unit	Rating	Speed regulation R(pu on unit MVA base)
1	600 MVA	6%
2	500 MVA	4%

The units are operating in parallel, sharing 900 MW at the nominal frequency. Unit 1 supplies 500 MW and Unit 2 supplies 400 MW at 60 HZ. The load is increased by 90 MW. The load varies 1.5 percent for every 1 percent change in frequency. Find the steady-state frequency deviation and the new generation on each unit.

8. Write short notes on the following:

a) Hard limits and slack variables

b) Priority list method

c) Power pools

*****