Roll No.

B.E. / B.Tech. (Full Time) DEGREE END SEMESTER EXAMINATIONS, NOV / DEC 2011

ELECTRICAL & ELECTRONICS ENGINEERING BRANCH

SIXTH SEMESTER

EE 382 POWER SYSTEM OPERATION AND CONTROL

(REGULATIONS 2004)

Time: 3 hr Max. Marks: 100

Answer ALL Questions

PART-A (10 X 2 = 20 Marks)

1. What do you mean by spinning reserve.
2. State the function of AVR.
3. What is meant by free governor operation?
4. Write down the equation for area control error of two area system.
5. What is stability compensation?
6. List the methods of voltage control.
7. What is minimum up time in unit commitment problem?
8. What is the function of economic dispatch controller?
9. Define state estimation.
10. List the conditions for normal state of a power system.

PART-B (5 X 16 = 80 Marks)

11(a)(i). Describe about the different reserve requirements in power systems operation. (4)

(ii). A generating station has the following daily load cycle:

Time (hrs)	0-6	6-8	8-12	12-14	14-18	18-20	20-24
Load (MW)	45	35	75	20	80	25	50

Draw the load duration curve and calculate the load factor and plant capacity factor if the capacity of the plant is 120 MW. (12)

12(a). The data pertaining to a single area power system with a linear load frequency characteristics is given below:

Rated capacity	= 4000 MW
Operating load	= 3000 MW
Inertia constant, H	= 5 seconds
Speed regulation, R	= 0.03 p.u.
Governor time constant	= 0.08 seconds
Turbine time constants	= 0.5 seconds
System frequency	= 50 Hz

(i) For a change in load of 30 MW, determine the steady state frequency deviation and change in generation in MW and reduction in original load under steady state condition. (12)

(ii) Determine the critical gain, K_I of the controller. (4)

(Or)

(b). Two identical generators each rated 200 MW are operating in parallel. The droop characteristics of their governors are 4% and 5% respectively.

(i).If the generators were operating at 51 Hz on no-load, how would a load of 300 MW be shared between them? Find the system frequency. Assume free governor action and nominal system frequency is 50 Hz. (12)

(ii). What adjustment should be made for the machines to share the loads as in (i) but with a frequency of 50 Hz? (4)

13(a). Explain the operation of a typical excitation system and derive its transfer function model. (16)

(Or)

(b). Three supply points A, B and C are connected to a common bus bar M. Supply point A is maintained at a nominal 400 kV and is connected to M through a 400/230 kV transformer and a 230 KV line of reactance 65 Ω. Supply point B is nominally at 400 kV and is connected to M by a 400/230 kV transformer and a 230 kV line of 72 Ω reactance. Supply point C nominally at 230 kV and is connected to M by a 230 kV transmission line of 60 Ω reactance. If at a particular system load, the line voltage of M falls below its nominal value by 3.5 kV, calculate the magnitude of reactive voltage-ampere injection required at M to establish the original voltage. The pu reactance of both 400/230 kV transformer is 0.1. The p.u. values are expressed on 500 MVA base. Resistance may be neglected.(10) (16)

14(a)(i). Formulate the economic dispatch problem and derive the exact co-ordination equation. (8)

(ii). A constant load of 500 MW is supplied by two generators having a capacity of 300 MW each. The respective incremental fuel costs are