R15

Code No: 127GQ

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year I Semester Examinations, November/December - 2018
POWER SYSTEM OPERATION AND CONTROL
(Electrical and Electronics Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A **(25 Marks)**

1.a)	What are coordination equations? Give their physical significance.	[2]
b)	What is the need of economic operation of power systems?	[3]
c)	What is the importance of hydro thermal coordination?	[2]
d)	What is the need of optimal scheduling of hydrothermal system?	[3]
e)	Draw the block diagram representation of IEEE Type-1 model.	[2]
f)	What is the need of speed governing system?	[3]
g)	Define the control area.	[2]
h)	What is meant by tie–line bias control?	[3]
i)	What is the need of load compensation?	[2]
j)	What are the advantages and disadvantages of different types of compensation?	[3]

PART-B **(50 Marks)**

2.a) Define the following terms with reference to thermal plants.
i) Heat rate curve
ii) Incremental fuel rate curve
iii) Incremental production cost curve

b) Incremental fuel costs in Rs/MWh for 2units in a plant are given by
$\frac{dc_1}{dp_1}=0.15P_1+25$, $\frac{dc_2}{dp_2}=0.12P_2+15$.
The minimum and maximum loads on each unit are to be 20MW and 125 MW respectively. Determine IFC and allocation of load between units for the minimum cost and load is 150MW. Assume both the units are operating. [5+5]

OR

3.a) What is a penalty factor in economic scheduling? Explain its significance.

b) The fuel input per hour of plant 1 and 2 are given as
$C_1=0.2P_1^2+40P_1+120$ Rs/h
$C_2=0.25P_2^2+30P_2+150$ Rs/h
Determine the economic operating schedule and the corresponding cost of generation if the max and min loading on each unit is 100MW and 25MW, the demand is 180 MW and transmission losses are neglected. If the load is equally shared by both the units, determine the saving obtained by loading the units as per equal incremental production cost. [5+5]

4. A two plant system having a steam plant near the load centre and hydro plant at a remote location. The load is 4500MW for 16hrs a day. The characteristics of the units are

$C_1 = 0.075\ P_T^2 + 45P_T + 120$,
$W_2 = 0.0028\ P_H^2 + 0.6P_H$,
$B_{22} = 0.001 MW^{-1}$.

Find the generation schedule, daily water used by the hydro plant and daily operating cost of thermal plant for $\gamma_j = 85.5\ Rs/m^3$-hr. [10]

OR

5. Explain the hydro thermal economic load scheduling. Derive the necessary equations. [10]

6.a) Obtain the first order turbine model with neat block diagram.
b) What are the fundamental characteristics of an excitation system? [5+5]

OR

7.a) Draw the block diagram representation of steam turbine and obtain the approximate linear model.
b) Derive the derivation of small signal transfer function for speed governing system. [5+5]

8. Draw the block diagram of load frequency control and economic load dispatch? Explain its combined operation. [10]

OR

9.a) Explain clearly about proportional plus integral load frequency control with a block diagram.
b) Obtain the tie line power for two area LFC system. [5+5]

10.a) Explain the specifications of load compensation.
b) Discuss the need of transmission lines compensation. [5+5]

OR

11. Explain clearly what you mean by compensation of lines and discuss briefly different methods of compensation. [10]

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