[Total No. of Questions - 9] [Total No. of Printed Pages - 3] (2125)

15252

B. Tech 7th Semester Examination

Power System Operation and Control (OS)

EE-7002

Time : 3 Hours **Max. Marks : 100**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : (i) Attempt five questions, selecting one from each of the section A, B, C, D and all the subparts of section E.

(ii) Assume suitably any missing data.

SECTION - A

1. (a) Draw and explain the input - output characteristics of a hydro plant (10)

   (b) Incremental fuel cost of two generating units is:

   $IC_1 = 30 + 0.2\ P_1$; $IC_2 = 25 + 0.3\ P_2$ Rs / mWh, respectively. Find the saving in fuel cost in rupees annually for optimal scheduling of a total load of 140 mW, as compared to equal distribution of the same load between the two units. (10)

2. Draw the flow chart and develop the mathematical model for the forward dynamic programming algorithm, taking into account the start-up costs of the units. (20)

SECTION - B

3. The fuel inputs per hour of plants 1 and 2 are given as

   $F_1 = 0.2P_1^2 + 40P_1 + 120$ Rs. per hr

   $F_2 = 0.2\ P_2^2 + 30\ P_2 + 150$ Rs. per hr **[P.T.O.]**

   Determine the economic operating schedule and the corresponding cost of generation if the maximum and minimum loading on each unit is 100 mW and 25 mW, the demand is 180 mW, and the 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. (20)

4. (a) Write the equality and inequality constraints considered in the economic dispatch problem. (10)

   (b) The incremental fuel costs of two plants are:

   $IC_1 = 0.07P_1 + 15$ Rs/mWh

   $IC_2 = 0.08\ P_2 + 11$ Rs/mWh

   The loss coefficients are given in the following matrix:

   $$B = \begin{bmatrix} 0.002 & -0.0004 \\ -0.0004 & 0.0024 \end{bmatrix} mW^{-1}$$

   For the value of incremental cost of received power λ = Rs 25 / mWh, find the economically scheduled generation of both plants, total load and losses. (10)

SECTION - C

5. What is short-term hydrothermal scheduling problem? Draw the flowchart and explain the procedure of short term hydrothermal scheduling problem using γ-λ iteration method. (20)

6. Explain the dynamic programming application to the hydrothermal scheduling problem. (20)

SECTION - D

7. Explain in detail the generator voltage control. (20)

8. With the neat block diagram, discuss and explain the integration of economic dispatch with load frequency control. (20)

SECTION - E

9. (a) What is an incremental fuel cost and what are its units?

(b) What is the difference between input-output characteristics of steam units and hydro units?

(c) Define minimum up time and minimum down time constraint in the unit commitment problem.

(d) Explain what you mean by unit commitment and how does it differ from economic load dispatch problem?

(e) What is the objective in economic load scheduling?

(f) List the constraints in unit commitment problem.

(g) What are the advantages of hydrothermal combinations?

(h) What is short-term hydrothermal co-ordination?

(i) What is meant by load frequency control?

(j) What is basic generator control loop? (10x2=20)