**UNIVERSITY OF ENGINEERING AND**

**TECHNOLOGY LAHORE**



**Assignment # 4**

**Dynamic Programming solution to Hydrothermal scheduling**

**Course Title: Advanced Power System Operation and Control**

**Course Code: EE 641**

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**Problem Statement**

A Hydro plant must be operated in conjunction with a Steam plant to serve a time varying load for a 24-hour period. The day is divided into six individual periods of 4h each. The load demand for the different periods is given below:

|  |  |
| --- | --- |
| Period j | (MW) |
| 1 | 600 |
| 2 | 1000 |
| 3 | 900 |
| 4 | 500 |
| 5 | 400 |
| 6 | 300 |

Hydroelectric Plant

The minimum and maximum storage limits for the Hydro plant reservoir are given by:

The storage volume at the start and end of the day must be 10000 acre.ft.

The water use rate of the hydroelectric plant is given by:

Where is the generated hydroelectric power and q is the water discharge rate in acre.ft/h.

There is no spillage and the natural inflow rate is 1000 acre.ft/h.

Steam Plant

The steam plant production cost function is:

The marginal cost function is:

The Dynamic programming algorithm tries to schedule the two power plants optimally to meet the load demand and operational constraints for the six 4-hour time periods. It is also desired to minimize the production cost for the compound generation system.

The results for the first period are shown in the table below and the diagram shows the initial trajectories for the dynamic programming algorithm.