Integration of Economic Dispatch Control with LFC

- Economic load dispatch and LFC play a vital role in modern power system. In LFC, zero steady-state frequency error and a fast, dynamic response wereachieved by integral controller action.
- But this control is independent of economic dispatch, i.e., there is no control over the economic loadings of various generating units of the control area.
- Some control over loading of individual units can be exercised by adjusting the gain factors (K) of the integral signal of the ACE as fed to the individual units. But this is not a satisfactory solution.
- A suitable and satisfactory solution is obtained by using independent controls of load frequency and economic dispatch.
- The load frequency controller provides a fast-acting control and regulates the system around an operating point, whereas the economic dispatch controller provides a slow-acting control, which adjusts the speed-changer settings every minute in accordance with a command signal generated by the central economic dispatch computer.

  EDC—economic dispatch controller

  CEDC—central economic dispatch computer
- The speed-changer setting is changed in accordance with the economic dispatch error signal, (i.e., $P_{G\ desired} - P_{G\ actual}$) conveniently modifiedby the signal $\int ACE\ dt$ at that instant of time.
- The central economic dispatch computer (CEDC) provides the signal $P_{G\ desired}$, and this signal is transmitted to the local economic dispatch controller (EDC).
  - The system they operate with economic dispatch error is only for very short periods of time before it is readily used
- This tertiary control can be implemented by using EDC and EDC works on the cost characteristics of various generating units in the area.
- The speed-changer settings are once again operated in accordance with an economic dispatch computer program.
- The CEDCs are provided at a central control center. The variable partof the load is carried by units that are controlled from the central control center. Medium-sized fossil fuel units and hydro-units are used for control.

- During peak load hours, lesser efficient units, such as gas-turbine units or diesel units, are employed in addition; generators operating at partial output (with spinning reserve) and standby generators provide a reserve margin.
- The central control center monitors information including area frequency, outputs of generating units, and tie-line power flows to interconnected areas.
- This information is used by ALFC in order to maintain area frequency at its scheduled value and net tie-line power flow out of the area at its shedding value.
- Raise and lower reference power signals are dispatched to the turbine governors of controlled units. Economic dispatch is co-ordinated with LFC such that the reference power signals dispatched to controlled units move the units toward their economic loading and satisfy LFC objectives.