# GLOSSARY OF SYMBOLS

| Symbol | Definition |
|--------|------------|
| $a_i$  | Cost coefficient of generator ($/\text{MWh}^2$) |
| $b_i$  | Cost coefficient of generator ($/\text{MWh}$) |
| $c_i$  | Cost coefficient of generator |
| $\alpha_i$ | Emission coefficient of generator (lb/MWh$^2$) |
| $\beta_i$ | Emission coefficient of generator (lb/MWh) |
| $\gamma_i$ | Emission coefficient of generator |
| $\phi$ | Total operating cost ($/\text{hr}$ or Rs/hr) |
| $h_i$  | Price penalty factor ($/\text{lb}$) |
| $h_m$  | Modified price penalty factor ($/\text{lb}$) |
| $\beta$ | Scaling factor |
| $P'_\text{gi}$ | Off-spring vector of real power generation (MW) |
| $\sigma_i$ | Standard deviation |
| $F_i$  | Fuel cost of $i^{th}$ generator ($/\text{hr}$ or Rs/hr) |
| $f_{\text{min}}$ | Minimum value of fuel cost in the generation ($/\text{hr}$ or Rs/hr) |
| $A$    | Large constant |
| $N_{\text{m}}$ | Maximum value of generations |
| $\text{WT}$ | Wheeling transactions |
| $\lambda_i$ | Incremental cost of $i^{th}$ generator ($/\text{MWhr}$) |
| $\lambda_j$ | Incremental cost of $j^{th}$ generator ($/\text{MWhr}$) |
| $A_T$  | Magnitude of feasible transaction (MW) |
| $P_{f_i}$ | Penalty factor of bus $i$ |
\( P_{gi} \) Power generation of unit i at previous hour (MW)

\( UR_i \) Increasing ramping rate limit of generator unit I (MW/hr)

\( DR_i \) Decreasing ramping rate limit of generator unit I (MW/hr)

\( B_j \) Generalized loss coefficients (MW\(^{-1}\))

\( C_t \) Total congestion cost ($/MWh)

\( C^+_{m,i} \) Incremental bid of the generator ($/MWh)

\( C^-_{m,i} \) Decremental bid of the generator ($/MWh)

\( \Delta P \) Change in preferred schedule (MW)

\( C \) Total transmission annual revenue requirement ($/hr or Rs/hr)

\( C_{CT} \) Wheeling transaction cost ($/hr or Rs/hr)

\( L_f \) Length of the transmission line f (Km)

\( C_f \) Annual revenue requirement per hour of the facility f ($/yr or Rs/yr)

\( F \) Optimal cost of generation ($/hr or Rs/hr)

\( FC \) Fuel cost ($/hr or Rs/hr)

\( EC \) Emission cost (lb/hr)

\( N_g \) Number of generators

\( P_{gi} \) Real power generation of i\(^{th}\) generator (MW)

\( P_d \) Total load of the system (MW)

\( P_l \) Transmission loss of the system (MW)

\( P_i \) Calculated real of PQ bus i (MW)

\( Q_i \) Calculated reactive of PQ bus i (MVAr)

\( P_{i,\text{net}} \) Specified real power of PQ bus i (MW)

\( Q_{i,\text{net}} \) Specified reactive power of PQ bus i (MVAr)
\[ P_m \quad \text{Calculated real of PV bus } m \ (\text{MW}) \]
\[ P_m^{\text{net}} \quad \text{Specified real power of PV bus } m \ (\text{MW}) \]
\[ |V| \quad \text{Voltage magnitude of buses (p.u.)} \]
\[ \delta \quad \text{Phase angles of buses (degrees)} \]
\[ P_{gi}^{\text{min}} \quad \text{Minimum value of real power allowed at generator } i \ (\text{MW}) \]
\[ P_{gi}^{\text{max}} \quad \text{Maximum value of real power allowed at generator } i \ (\text{MW}) \]
\[ V_{i}^{\text{min}} \quad \text{Minimum value of voltage at bus } i \ (\text{p.u.}) \]
\[ V_{i}^{\text{max}} \quad \text{Maximum value of voltage at bus } i \ (\text{p.u.}) \]
\[ \text{MVA}_{f_{p,q}} \quad \text{Maximum rating of transmission line connecting bus } p \text{ and } q \ (\text{MVA}) \]