

LIST OF SYMBOLS AND ABBREVIATIONS

\[ \alpha, \beta, \gamma \] : Thermal generation cost coefficients
\[ \Delta E \] : Increase in objective value in the neighbor
\[ \tau_{i,m} \] : Water transport delay from reservoir \( \sigma \) to \( i \)
\[ A, B, C, D \] : Cost function parameters (Rs/Hr, Rs/MW-Hr, Rs/MW^2-Hr, Rs/MW^3-Hr) at hour \( t \) and 0 otherwise
\[ A_i, B_i, C_i \] : Cost function parameters of unit \( i \) (Rs/MW^2 Hr, Rs/MW Hr, at hour \( t \) and 0 otherwise.
\[ C_{i,1} \text{ to } C_{i,6} \] : Hydro power generation coefficients
\[ C_p \] : Control parameter of the cooling schedule (Degree)
\[ D_i, E_i \] : Start-up cost coefficients for unit \( i \) (Rs)
\[ E_c \] : Energy of the current configuration
\[ E_{\text{Config}} \] : Energy of a given configuration
\[ E_t \] : Energy of the trial configuration
\[ F \] : Composite cost function
\[ F_i \] : Fuel cost of \( i^{th} \) thermal unit in Rs/Hr
\[ F_{it}(P_{it}) \] : Production cost of unit \( i \) at a time \( t \) (Rs/Hr)
\[ F_T \] : Total operating cost over the scheduled horizon (Rs/Hr)
\[ H_i(t) \] : Net head of \( i^{th} \) reservoir at time \( t \) in m
\[ i,m \] : Reservoir index, index of reservoir upstream of the \( i^{th} \) reservoir
\[ I_{th}(i,t) \] : Inflow rate of \( i^{th} \) reservoir at time \( t \) in m^3
\[ \text{Irlist} \] : List of ON units in ascending order of efficiency
\[ K \] : Constant
\[ N \] : Number of available generating units
OBJ : Objective cost function
Oplist : List of OFF units in descending order of efficiency
P_{config} : Probability of a given configuration
P_D(t) : Power demand at time t in MW
PD_t : System peak demand at hour t (MW).
P_h(i,t) : Generation of i^{th} hydro unit at time t in MW
P_h(i,t)^{min} : Minimum generation of i^{th} hydro unit a time t in MW
P_h(i,t)^{max} : Maximum generation of i^{th} hydro unit a time t in MW
P_i : Output generation for unit i in MW
P_{it} : Output power from unit i at time t (MW)
P_l : Total system load in MW
P_l(t) : Total Transmission line losses at time t in MW
P_{max,i} : Maximum generation limit of unit i (MW)
P_{min,i} : Minimum generation limit of unit i (MW)
P_r(i,t) : Generation of i^{th} thermal unit at time t in MW
P_r(i,t)^{min} : Minimum generation of i^{th} thermal unit at time t in MW
P_r(i,t)^{max} : Maximum generation of i^{th} thermal unit at time t in MW
Q_h(i,t) : Water discharge rate of i^{th} reservoir at time t in m^3/Hr
Q_h(i,t)^{min} : Minimum water discharge rate of i^{th} reservoir at time t in m^3
Q_h(i,t)^{max} : Maximum water discharge rate of i^{th} reservoir at time t in m^3
Rand (x,y) : random numbers between x and y
R_h / R_s : Set of Hydro/Thermal plants in the system Rs/Hr)
R_t : Spinning reserve at time t (MW).
R_u : Set of upstream units directly above i^{th} hydro unit
S_h(i,t) : Spillage of i^{th} reservoir at time t in m^3
S_{it} : Start up cost of unit i at hour t (Rs).
S_{0i} : Unit i cold start – up cost (Rs).
T : Scheduled time horizon (24 hrs)
t,T : Time index, scheduling period
Tdowri : Unit i minimum down time (Hr)
Toff i : Duration for which unit i is continuously OFF (Hr)
Ton i : Duration for which unit i is continuously ON (Hr)
Tshut i : Instant of shut down of a unit i (Hr)
Tstart i : Instant of start up of a unit i (Hr)
Tup i : Unit i minimum up time (Hr)
U (0,1) : Uniform distribution with parameters 0&1
Uit : Unit i status at hour t = 1 (if unit is ON) = 0 (if unit is OFF)
UD (a,b) : Discrete uniform distribution with parameters a and b.
Vit : Unit i start up /shut down status at hour t = 1if the unit is started
V_i^\text{begin} : Initial storage volume of i^{th} reservoir in m$^3$
V_i^\text{end} : Final storage volume of i^{th} reservoir in m$^3$
V_{i}(i,t) : Storage volume of i^{th} reservoir at time t in m$^3$
V_{i}(i,t)^{\text{min}} : Minimum storage volume of i^{th} reservoir at time t in m$^3$
V_{i}(i,t)^{\text{max}} : Maximum storage volume of i^{th} reservoir at time t in m$^3$
V_{i}^\text{begin} : Storage volume of i^{th} reservoir at beginning in m$^3$
V_{i}^\text{end} : Storage volume of i^{th} reservoir at ending in m$^3$