**Nomenclature**

A  Area of PV module, m$^2$

b  Breadth of PV module, m

$m_a$  Rate of flow of air mass, kg/s

c$\text{a}$  Specific heat of air, kJ/kg K

d$\text{e}$  Elemental length, m

EVA  Ethyl vinyl Acetate

$h_{pl}, h_{p2}$  Penalty factor due to glass cover of PV module (dimensionless)

$U_t$  Overall heat transfer co-efficient from solar cell to ambient through glass cover, W/m$^2$ K

$U_T$  Overall heat transfer co-efficient from solar cell to back surface through tedlar, W/m$^2$ K

$h_r$  Heat transfer co-efficient from back surface to air through tedlar, W/m$^2$ K

$U_{bi}$  An overall heat transfer co-efficient from flowing air to ambient, W/m$^2$ K

$U_{tc}$  An overall heat transfer co-efficient from solar cell to ambient through glass cover, W/m$^2$ K

$U_{TC}$  An overall heat transfer co-efficient from solar cell to air through glass, W/m$^2$ K

$h_{bf}$  Heat transfer co-efficient from black surface to flowing air, W/m$^2$ K

$U_{bp}$  Overall heat transfer co-efficient from bottom to ambient, W/m$^2$ K

$U_{bs}$  An overall heat transfer co-efficient from solar cell to ambient through two glass cover, W/m$^2$ K

$U_s$  An overall heat transfer co-efficient from solar cell to air through glass cover, W/m$^2$ K
Heat transfer co-efficient from flowing air to ambient through upper glass, W/m² K

I(t) Incident solar intensity on the inclined module surface, W/m²

\( Q_{\text{thermal}} \) Rate of useful energy, W

\( T_a \) Ambient temperature, °C

\( T_{\text{air}} \) Flowing air temperature inside the duct, °C

\( T_{\text{air in}} \) Inlet air temperature, °C

\( T_{\text{air out}} \) Outlet air temperature, °C

N number of PVT air collectors

t time, s

T temperature, K

Subscript

T Opaque PV module having duct below the module

TG Opaque PV module having duct above the module

G Semitransparent PV module having duct below the module

GG Semitransparent PV module having duct above the module.

\( air \text{ in} \) Inlet air

\( air \text{ out} \) outlet air

a ambient

c solar cell

eff effective

bs back surface

T tedlar

G glass
module
insulation

Greek alphabets

τ transmittivity
χa Energy production factor
φlife (t) Life cycle conversion efficiency
α absorptivity
βc packing factor

ηel temperature dependent electrical efficiency
β0 temperature coefficient,K⁻¹
η0 efficiency at standard test condition
ρ density,kg/m³

Abbreviations

EPBT Energy payback time
EPF Energy payback factor
LCCE Life cycle conversion efficiency
LCCA Life cycle cost analysis
CPRF Capital recovery factor
AUC Annualized uniform cost
NPVL Net present value