List of Symbols
(In the order they appear in the text)

σ	normal stress
F_n	force
$\boldsymbol{T}_n$	force vector on a plane with normal n
$\boldsymbol{T}_{x,y,z}$	components of force vector in x, y, z directions
A	area of section
A	normal to the section
τ	shear stress
$\sigma_{x,y,z}$	normal stress on x-plane, y-plane, z-plane
$\tau_{xy,yz,zx}$	shear stress on x-plane in y-direction, shear stress on y-plane in z-direction, shear stress on z-plane in x-direction
n_x, n_y, n_z	direction cosines of n in x, y, z directions
$\sigma_1, \sigma_2, \sigma_3$	principal stresses at a point
I_1, I_2, I_3	first, second, third invariants of stress
σ_{oct}	normal stress on octahedral plane
τ_{oct}	shear stress on octahedral plane
$\sigma_r, \sigma_\theta, \sigma_z$	normal stresses in radial, circumferential, axial (polar) direction
γ, θ, φ	spherical coordinates
$\tau_{\gamma\theta}, \tau_{\gamma z}, \tau_{\theta z}$	shear stresses in polar coordinates
u_x, u_y, u_z	displacements in x, y, z directions
E_{xx}, E_{yy}, E_{zz}	linear strains in x-direction, y-direction, z-direction (with non-linear terms)
$\varepsilon_{xx}, \varepsilon_{yy}, \varepsilon_{zz}$	linear strains (with linear terms only)
E_{xy}, E_{yz}, E_{zx}	shear strain components (with non-linear terms)
$\gamma_{xy}, \gamma_{yz}, \gamma_{zx}$	shear strain components (with linear terms only)
$\omega_x, \omega_y, \omega_z$	rigid body rotations about x, y, z axes
$\Delta = \varepsilon_{xx} + \varepsilon_{yy} + \varepsilon_{zz}$	cubical dilatation
$\varepsilon_1, \varepsilon_2, \varepsilon_3$	principal strains at a point
J_1, J_2, J_3	first, second, third invariants of strain

$\varepsilon_r, \varepsilon_\theta, \varepsilon_z$	strains in radial, circumferential, axial directions
λ, μ	Lame's constants
$G = \mu$	rigidity modulus
μ	engineering Poisson's ratio
E	modulus of elasticity
K	bulk modulus; stress intensity factor
P	pressure
υ	Poisson's ratio
σ_y	yield point stress
U	elastic energy
U^*	distortion energy; complementary energy
σ_{ut}	ultimate stress in uniaxial tension
σ_{ct}	ultimate stress in uniaxial compression
a_{ij}	influence coefficient; material constant
b_{ij}	compliance component
M_x, M_y, M_z	moments about x, y, z axes
δ	linear deflection; generalized deflection
I_x, I_y, I_z	moments of inertia about x, y, z axes
I_ρ	polar moment of inertia
I_{xy}, I_{yz}	products of inertia about xy and yz coordinates
T	torque; temperature
Ψ	warping function
α	coefficient of thermal expansion
Q	lateral load
P	axial load
V	elastic potential
ν_{ij}	Poisson's ratio in i-direction due to stress in j-direction
b, w	width
t	thickness
K_t	theoretical stress concentration factor
N	normal force
ϕ	stream function
ρ	fillet radius
D, d	radii
q	notch sensitivity
K_c, K_{Ic}	fracture toughness in mode I
S_y	offset yield stress
ω	angular velocity
R	fracture resistance
σ_{fr}	fracture stress
Γ	boundary
J	J-integral

SI Units
(Systeme International d'Unit'es)

(a) Base Units

Quantity	*Unit (Symbol)*
length	meter (m)
mass	kilogram (kg)
time	second (s)
force	newton (N)
pressure	pascal (Pa)

force is a derived unit: kgm/s^2
pressure is force per unit area: N/m^2: kg/ms^2
kilo-watt is work done per second: kNm/s

(b) Multiples

giga (G)	1 000 000 000
mega (M)	1 000 000
kilo (k)	1 000
milli (m)	0.001
micro (μ)	0.000 001
nano (n)	0.000 000 001

(c) Conversion Factors

To Convert	*to*	*Multiply by*
kgf	newton	9.8066
kgf/cm^2	Pa	9.8066×10^4
kgf/cm^2	kPa	98.066
newton	kgf	0.10197
Pa	N/m^2	1
kPa	kgf/cm^2	0.010197
HP	kW	0.746
HP	kNm/s	0.746
kW	kNm/s	1

Typical Physical Constants
(As an Aid to Solving Problems)

Material	*Ultimate Strength (MPa)*			*Yield Strength (MPa)*		*Elastic Modulus (GPa)*		*Poisson's Ratio*	*Coeff. Therm Expans. per °C*
	Tens.	*Comp*	*Shear*	*Tens or Comp*	*Shear*	*Tens*	*Shear*		*× 10⁻⁶*
Aluminium alloy	414	414	221	300	170	73	28	0.334	23.2
Cast iron, gray	210	825	—	—	—	90	41	0.211	10.4
Carbon steel	690	690	552	415	250	200	83	0.292	11.7
Stainless steel	568	568	—	276	—	207	90	0.291	17.0

For more accurate values refer to hand-books on material properties