MECH530 – Assignment 3
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CHOSEN MATERIAL: graphite_epoxy_2 (AS/H3501)

================= MATERIAL PROPERTIES =================

Modulus Parameters

E_x	138000.000	MPa
E_y	8960.000	MPa
E_s	7100.000	MPa
nu_x	0.300	none
nu_y	0.019	none
m	1.006	none

Strength Parameters

X_t	1447.000	MPa
X_c	1447.000	MPa
Y_t	51.700	MPa
Y_c	206.000	MPa
S_c	93.000	MPa
h_o	0.125	mm
rho	1600.000	kg/m^3

================= GEOMETRY PARAMETERS =================

Layer Number	Type	Thickness (mm)	Orientation (degrees)
1	ply	0.125	0
2	ply	0.125	0
3	ply	0.125	20
4	ply	0.125	-20
5	ply	0.125	90
6	ply	0.125	45
7	ply	0.125	-45
8	ply	0.125	-45
9	ply	0.125	45
10	ply	0.125	90
11	ply	0.125	-20
12	ply	0.125	20
13	ply	0.125	0
14	ply	0.125	0

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================= ON-AXIS MATRICES =================

Matrix [S] (in MPa^-1):
      7.246e-06      -2.174e-06       0.000e+00
     -2.174e-06       1.116e-04       0.000e+00
      0.000e+00       0.000e+00       1.408e-04

Matrix [Q] (in MPa):
     138811.140        2703.800           0.000
       2703.800        9012.665           0.000
          0.000           0.000        7100.000

================= Assignment 2, Question 1 =================

================= OFF-AXIS MATRICES PER LAYER =================

- NOT COMPUTED -

================= Assignment 2, Question 2 =================

Off-Axis Stress Vector (Given) (MPa):
      9.990e+03
     -3.100e+03
     -4.400e+03

Off-Axis Strain Vector:
      7.013e-01
     -1.090e-01
     -9.261e-01

On-Axis Stress Vector (MPa):
      1.549e+03
      5.341e+03
     -7.655e+03

On-Axis Strain Vector:
     -3.874e-04
      5.927e-01
     -1.078e+00

================= Assignment 3, PART 1 =================

A Matrix (in N/m):
      1.503e+08       2.487e+07       0.000e+00
      2.487e+07       6.812e+07       0.000e+00
      0.000e+00       0.000e+00       3.257e+07
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a Matrix (in m/N):
      7.082e-09      -2.586e-09       0.000e+00
     -2.586e-09       1.562e-08       0.000e+00
      0.000e+00       0.000e+00       3.071e-08

================= Assignment 3, PART 2 =================

Off-Axis Stress Resultant Vector (Given) [N/m]:
      8.800e+06
     -4.800e+06
      8.400e+06

Off-Axis Strain Vector:
      7.473e-02
     -9.775e-02
      2.579e-01

================= Assignment 3, PART 3 =================

Ply Angle: 0 degrees

On-Axis Stress Vector [MPa]:
      1.011e+04
     -6.789e+02
      1.831e+03

On-Axis Strain Vector:
      7.473e-02
     -9.775e-02
      2.579e-01

Ply Angle: 0 degrees

On-Axis Stress Vector [MPa]:
      1.011e+04
     -6.789e+02
      1.831e+03

On-Axis Strain Vector:
      7.473e-02
     -9.775e-02
      2.579e-01

Ply Angle: 20 degrees
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On-Axis Stress Vector [MPa]:
      1.865e+04
     -1.075e+03
      6.158e+02

On-Axis Strain Vector:
      1.375e-01
     -1.605e-01
      8.673e-02

Ply Angle: -20 degrees

On-Axis Stress Vector [MPa]:
     -3.920e+03
     -2.860e+01
      2.190e+03

On-Axis Strain Vector:
     -2.835e-02
      5.330e-03
      3.085e-01

Ply Angle: 90 degrees

On-Axis Stress Vector [MPa]:
     -1.337e+04
      4.092e+02
     -1.831e+03

On-Axis Strain Vector:
     -9.775e-02
      7.473e-02
     -2.579e-01

Ply Angle: 45 degrees

On-Axis Stress Vector [MPa]:
      1.593e+04
     -9.485e+02
     -1.225e+03

On-Axis Strain Vector:
      1.175e-01
     -1.405e-01
     -1.725e-01
```

Ply Angle: -45 degrees

On-Axis Stress Vector [MPa]:
     -1.918e+04
      6.788e+02
      1.225e+03

On-Axis Strain Vector:
     -1.405e-01
      1.175e-01
      1.725e-01