School of Engineering and Applied Science (SEAS), Ahmedabad University

Name: _____ Roll no.: _____

M. Tech. (Composites): Term I
Subject Name: Mechanics of Composites (CMP612).
End Term Exam (Monsoon Sem.:2025); Marks: 50, Wt.:25 %
December 9, 2025, Wednesday, 8.00 – 10.00 AM

Instructions:

1 All questions are compulsory.
2 All acronyms and symbols carry their usual meaning.
3 Assume suitable data wherever necessary and specify it clearly in your answers.
4 Use of scientific / programmable calculators allowed
5 Use of laptop and study material is permitted except use of internet related services

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Q-1. A laminate specimen of ply combination $[0/30/60/90]_s$ and lamina thickness 0.2 mm made of graphite - epoxy is subjected to deformation in such a way that it undergoes reference surface strains as specified below. What are the forces acting on the laminate corresponding to reference surface strains? Plot these forces on the laminate.

$\varepsilon_x^0(x,y) = 300\times10^{-5}$

$\varepsilon_{xy}^0(x,y) = 200\times10^{-5}$

$E_1 = 155$ GPa
$E_2 = 12.10$ GPa
$\nu_{12} = 0.248$
$G_{12} = 4.4$ GPa

Q-2. A laminate specimen of ply combination $[[0/45/-45/90]_2]_s$ and lamina thickness 0.2 mm made of graphite -epoxy is subjected to forces as specified below. Predict whether failure will occur or not using Tsai-Wu failure criteria using the material property data given below.

$N_x = 10000$
$N_y = 10000$
$N_{xy} = M_x = M_y = 0$
$M_{xy} = 1000$

$E_1 = 155$ GPa
$E_2 = 12.10$ GPa
$\nu_{12} = 0.248$
$G_{12} = 4.4$ GPa

$\sigma_1^T = 1500$ MPa
$\sigma_1^C = 1250$ MPa
$\sigma_2^T = 50$ MPa
$\sigma_2^C = 200$ MPa
$\tau_{12}^F = 100$ MPa