

Final exam

Final exam consists of six (6) assignments and only five (5) of those are answered (max 50 points).

Remember that the credit points will not be registered if you do not fill Kaiku feedback!

You can answer in English or in Finnish.

1. Explain the following terms related to composite technology:

- a. Balanced laminate (2p)
- b. DCB test (2p)
- c. PRIM (2p)
- d. Sizing (2p)
- e. Orthotropic material (2p)

✓ 2. Describe the manufacturing process of PAN-based carbon fibers. Explain the differences between HS, IM and HM -fibres. What are the differences in the manufacturing process of these fibres? (10p)

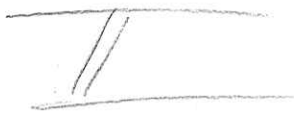
oxidation
Carbonization
(graphitization)

✓ 3. Explain three different adhesion mechanisms that can bond fibres and the matrix in a laminate. (10p)

✓ 4. The 'sandwich effect'. Explain what is characteristics for sandwich structures and why? Give examples where sandwich structures are utilized. (10p)

✓ 5. Describe the different delamination failure modes of a laminate and explain shortly the techniques how those can be tested. (10p)

✓ 6. How would you manufacture a fibre-reinforced pressure vessel (diameter 2.5 m), which should tolerate high pressures and strong acids? Mention only one manufacturing method that has been discussed during the course. Define also the materials that you would use in such application. Explain your answer. (10p)



ILS

Polyurethane Reactor Injection Moulding



Disbond

