

**Puu-21.3000 Päällystystekniikka**

**Puu-21.3000 Coating technology**

*JP*

**Tentti/Exam 20.12.2006**

Tenttikysymykset – 4 esseekysymystä ja monivalintatehtävä ovat ensin suomeksi ja sitten englanniksi.  
The exam questions – 4 essay questions and a multiple-choice question are first introduced in Finnish and then in English.

**Tenttiohje:** Palauta tämä kysymyspaperi monivalintatehtävän vastauksin sekä essee-vastausten konseptipaperit yhdessä nimellä ja opiskelijanumerolla varustettuna.

**Instructions:** Return this question paper with answers to the multiple-choice question and the papers with answer to the essay questions both completed with your name and student number.

Nimi/Name:

Op.Nro/Student nr:

Questions in English

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1. Describe what is meant with the following terms (short explanation) (6 p)

- a) film transfer coating
- b) insolubilizer (hardener)
- c) Jet application
- d) GCC
- e) Calcined kaolin
- f) Soft calendering

2. Describe the factors affecting coating color viscosity and the mechanisms of these factors? (6 p)

3. Describe the parts and components in a coating machine line. Introduce the typical coating methods used for different paper and board grades. (6 p)

4. a) Describe the coating color composition and shortly the properties of the main compounds/components. What are the principles in designing a coating color recipe? (3 p)

b) Calculate the dosages for coating color compounds and water, and the total amount of coating color, by using the values given in the table below. The total amount of dry pigment is 6000 g and the target for dry solids content for the coating color is 62%.

(3 p)

Coating color recipe for question 4b

Pigment: 100 parts          6000 g

RECIPE CALCULATION				
RECIPE 3	Parts	Dry amount, g	Solids, %	Dosage, g
Calcium carbonate	60	_____	71,9	_____
Kaolin clay	40	_____	73,8	_____
Latex	10	_____	50,0	_____
CMC	0,5	_____	10,0	_____
SUM				
Expected solids content of coating color		_____	62	_____
Total amount of coating color		_____		_____
Water		_____		_____

**Multiple-choice question**

Nimi/Name:

Op.Nro/Student nr:

4. Answer the questions below [yes / no] (12 x ½ p = 6 p)  
 Scoring: Right answer ½ p, wrong answer - ½ p, no answer (blank) 0 p

Claim	Yes	No
1. Pigment coating enhances paper general strength and stiffness when compared at fixed basis weight.		
2. Coating color viscosity usually decreases at high shear rates, if pigment particle size distribution becomes narrower.		
3. Water retention of coating color has a bigger influence when using roll application than if jet-application or short-dwell application is used.		
4. CaCO <sub>3</sub> has typically lower ISO-brightness than kaolins.		
5. Platy pigments form a more compact (higher density) coating layer structure compared with isometric pigments.		
6. Kaolin has lower shape factor (aspect ratio) than CaCO <sub>3</sub> .		
7. Coating color experiences high shearing under the metering blade. Shear rates at normal production speeds and coating weights are in order of magnitude of a 10 000 1/s.		
8. Increase of compressed base paper roughness causes an increase in coat weight in blade coating		
9. Base paper roughness or surface chemistry has no effect on coat weight or coating coverage in film coating.		
10. A mixture of kaolin and CaCO <sub>3</sub> is typically used for gravure-LWC coatings		
11. Starch as a binder forms harder and a more brittle film than latexes.		
12. PPS-roughness decreases and gloss increases with increasing calender running speed.		