**Course 3: “Paper’s Appearance,” Final Quiz**

**Complete the following form and take the quiz to receive a certificate of course completion. Please enter your information in the way you would like it to appear on your certificate. Send your completed form (in WORD or PDF format) as an email attachment to hubbe@ncsu.edu.**

**Your full name (print carefully or type):**

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**Having taken this course will help me to…**

**This course could be improved by…**

**My idea for a future course in this series would be…**

FINAL QUIZ FOR COURSE 3 (ten questions)

1 – Which of the following is a color coordinate that indicates the degree of yellowness (positive value) or blueness (negative value)?

1. b\*
2. x
3. L\*
4. z
5. – Which parameter (from Kubelka and Munk, 1931) indicates the tendency of a material to absorb light?

A S

B k

C R(∞)

D L\*

3 – Which type of mineral has the highest refractive index in this list?

1. CaCO3.
2. BaSO4.
3. SiO2.
4. TiO2.

4 – What type of dye is relatively large, planar, highly conjugated, and containing one or more sulfonate groups to render it water-soluble?

1. Acid dye
2. Basic dye
3. Direct dye
4. Colored pigment

5 - What is the term to describe the sequence of single and double carbon-carbon bonds such that a longer wavelength of light can be absorbed by an organic chemical compound?

1. Conjugation
2. Saturation
3. Unsaturation
4. Isomerization

6 – What is the best way to deal with the fact that online color data are offset due to the higher temperature of the paper during its production?

1. Add extra dye to compensate for the effect.
2. Reduce the dye addition to compensate for the effect.
3. Calibration, using lab tests.
4. Cool the web before the sensor.

7 – What terms give a good description of the kinds of “fixatives” that are widely used to increase the attachment of typical dyes (especially certain direct dyes having relatively low affinity) to the fiber surfaces?

1. Anionic or negatively charged
2. Reactive or surface-active
3. Monovalent or single-charged
4. Cationic or positively charged

8 – So that a higher proportion of a dye will end up on longer fibers, one would choose to add the dye at what point in the paper machine process?

1. To the process water (white water).
2. To the thick stock (before the fan pump).
3. At the accepts of the hydrocyclone cleaners.
4. At the size press (to the paper surface).

9 – How does a typical fluorescent whitener product achieve its whitening effect?

1. It absorbs red light and emits blue light.
2. It absorbs ultraviolet light and emits blue light.
3. It absorbs blue light and emits ultraviolet light.
4. It absorbs red light and emits yellow light.

10 – What is usually the least expensive way that papermakers can achieve a relatively large increase in opacity of white paper?

1. Increase the filler content.
2. Add a fluorescent whitening agent.
3. Increase the energy input of refining.
4. Apply higher pressure at the calenders.