

B.Tech. Fourth Semester (Food, Pulp & Paper, Oil & Paint & Petro Chem.) (CGS)

11017 : Pulp & Paper Technology - I : Paper 4 PT 02

P. Pages : 2

Time : Three Hours



AU - 2634

Max. Marks : 80

- Notes :
1. Due credit will be given to neatness and adequate dimensions.
 2. Assume suitable data wherever necessary.
 3. Diagrams and chemical equations should be given wherever necessary.
 4. Illustrate your answer necessary with the help of neat sketches.
 5. Use of slide rule logarithmic tables, Steam tables, Mollier's Chart, Drawing instrument, Thermodynamic table for moist air, Psychrometric Charts and Refrigeration charts is permitted.
 6. Discuss the reaction, mechanism wherever necessary.

SECTION - A

1. a) Write down the fiber properties and use as paper making raw material of bagasse, abaca and bamboo. 6
b) How would you measure moisture content of fibrous raw material? What do you understand by dry basis and wet basis of moisture determination? 4
c) In proximate analysis of raw material why first you have to determine alcohol benzene extraction and then use the same sample to find, out acid insoluble lignin (Klason's Lignin)? 3

OR

2. a) Draw the various steps involved in cell formation and growth, explain the lignification and death of cell in detail. 6
b) Why should you measure the specific gravity and weight of wood? 4
c) When you are studying the internal structure of wood how would you cut the wood? 3
3. a) A softwood fiber dimension was analysed using microscope. It was found that the length of fiber was 3.5 mm and width of the fiber was measured to be 200 μ m. The cell wall thickness of the fiber was measured to be 40.0 μ m. Calculate the aspect ratio and Muhlsteph ratio of this fiber. 3
b) When you are studying physical properties of fibers explain the significance of studying fiber curl, Runkel ratio and collapse index. 6
c) Draw a table showing the chemical composition of wood. Explain in brief your understanding of hemicellulos. 4

OR

4. a) Which cells in gymnosperm perform the function of transportation of food and nutrients in longitudinal direction? Explain in brief it's fiber morphology. 5
b) Differentiate between hardwood and softwood. 8
5. a) Explain with the help of a neat sketch Rowland model clarifying crystalline and amorphous cellulose. 6
b) How cellulose reacts with acids? Explain the acidic degradation of cellulose. 6
c) In which chemicals is cellulose dissolved while measuring it's viscosity? 2

OR

6. a) Explain with the help of chemical reaction oxidative degradation of cellulose. 6
b) If cellulose is soaked in sodium hydroxide of 15.0 to 20.0% concentration what would happen? 4
c) How does Manley model explain the ambiguity of crystalline and amorphous cellulose? 4

SECTION - B

7. a) Why hemicellulose is not preferred by rayon grade pulp manufacturer? 3
b) With the help of a neat chemical formula explain the structure and composition of galactoglucomannan. 5
c) Which type of hemicellulose is water soluble? Explain its structure and use. 5

OR

8. a) What do you understand by extractives? In what form is it useful to plants? 4
b) Explain the different types of terpenoids found in gymnosperm tree. In what form is it useful? 6
c) What is the chemical formulation of fats and where are they stored in plants? 3
9. a) Which observation in lignin chemistry was unexplained by 'Freudenberg's Lignification Hypothesis'? <http://www.sgbauonline.com> 3
b) With the help of chemical reaction explain the biochemical formation of lignin precursors. 8
c) Why glass transition temperature of lignin increases from 109 to 124°C during thermomechanical pulping? 2

OR

10. a) Explain how lignin forms bond with carbohydrate present in wood? 6
b) How does lignin react with chlorine in aqueous media? Explain with chemical reaction. 7
11. a) How would you use instrumental methods to identify functional group and bonds in lignin? 7
b) While reacting lignin with dioxane in aqueous acidic media what information do you get regarding structure of lignin? 7

OR

12. a) At which wavelength does lignin absorb light in UV vis spectrophotometer? 2
b) Write down the chemical reaction of converting lignin into dimethyl sulfide. 6
c) Can lignin be modified as a dispersant? Explain its use as dispersant. 6
