

National Exams

98-Chem-B5, Pulp & Paper Technology

3 hours duration

Notes:

1. If doubt exists as to the interpretation of any question, the candidate is urged to submit with the answer paper, a clear statement of any assumptions made.
2. Any non-communicating calculator is permitted. This is an Open Book exam. Note to candidates you must indicate the type of calculator being used, i.e. write the name and model designation of the calculator, on the first inside left hand sheet, of the exam work book.
3. Any three (3) questions constitute a complete paper. Only the first three questions as they appear in your answer book will be marked.
4. All questions are of equal value.

Question #1

A number of different pulping processes are used in the pulp & paper industry including:

- Mechanical pulping
- Thermomechanical pulping
- Semicheical pulping
- Sulfite pulping
- Alkaline pulping

Write brief descriptions outlining (i) why each process is used (in terms of raw material and end product) and (ii) the main unit operations involved in each process (a schematic flow sheet can be useful in this description).

QUESTION #2

Part (a)

Different bleaching sequences are used in the multistage bleaching of chemical pulps. Choose one such sequence and describe why the various stages are used in this sequence (choose a sequence based on your own experience or a sequence described in the reference material for this examination).

Part (b)

For the bleaching sequence described in part (a) of this question, describe the potential sources of water pollution and methods used to reduce the impact of these emissions.

QUESTION #3

Part (a)

Beating and refining of pulp fibre is a common operation in many papermaking processes. Describe how beating and refining is carried out and the impact of this operation on the final paper product.

Part (b)

Fibre bonding is important in the papermaking process. Describe factors that affect fibre bonding in a typical papermaking process.

QUESTION #4

The Fourdrinier paper machine has been traditionally used in many papermaking operations. Prepare a schematic flow diagram of a typical Fourdrinier machine labeling the primary components used in the dewatering, pressing and drying stages. Show typical flow rates for water and pulp at the various stages on your flow diagram. Provide brief descriptions of the primary components noting their purpose and effect on final product quality.