



**NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**DEPARTMENT OF APPLIED CHEMISTRY**  
**BACHELOR OF SCIENCE HONOURS DEGREE**  
**SUPPLEMENTARY EXAMINATIONS – AUGUST 2010**  
**INDUSTRIAL ORGANIC CHEMISTRY I – SCH 2215**  
**TIME: 3 HOURS**

**INSTRUCTIONS TO CANDIDATES**

Answer **ALL** questions in Section A and **ANY THREE** questions from Section B.

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**SECTION A** ANSWER **ALL** QUESTIONS (Each question carries 20 marks)

1. The following is an approximate yield per metric ton of coal carbonized:
- |                   |   |                   |
|-------------------|---|-------------------|
| Furnace Coke      | - | nil               |
| Coke Breeze       | - | nil               |
| Semi Coke         | - | 720kg             |
| Tar               | - | 75kg              |
| Ammonium Sulphate | - | 9kg               |
| Light Oil         | - | 8kg               |
| Gas               | - | 125m <sup>3</sup> |
- (a) What type of carbonization process is likely to produce the yields shown above? (4 marks)
- (b) Name the major constituents of the gas produced from carbonization of coal. (4 marks)
- (c) Describe the process by which the ammonium sulphate is produced from the flue gases of the coke oven. (8 marks)
- (d) What liquid products are produced from coal tar? (4 marks)
2. (a) What is wood cellulose? Of what use is cellulose to the pulp and paper industries? (2 marks)
- (b) Name four (4) paper fillers. (4 marks)
- (c) What is the purpose of sizing in paper manufacturing? (4 marks)
- (d) List three (3) disadvantages of the sulphite pulping process. (6 marks)
- (e) What are coated papers? Where are they used? (4 marks)

**SECTION B** ANSWER **ANY THREE (3)** QUESTIONS (Each Question Carries 20 marks)

1. Describe two (2) ways by which light oil can be processed from coal. Illustrate your answer with simple process flow diagrams. (20 marks)
2. (a) Distinguish between sulphate and sulphite pulping. (8 marks)  
(b) Describe the production process of two (2) naval stores from pine. (12 marks)
3. (a) During the refining process of pulp, various fillers, sizes and dyes are added. Briefly explain the purpose of these additions. (6 marks)  
(b) Identify two (2) problems which are likely to be encountered in a pulp and paper manufacturing plant. What solutions would you propose for each problem? (14 marks)
4. Explain with the help of relevant chemical equations the following chemical conversion terms in intermediates manufacture:
  - (a) Nitration
  - (b) Sulfonation
  - (c) Halogenation
  - (d) Hydrolysis (20 marks)
5. (a) What is gun cotton? Briefly explain how it is manufactured. (10 marks)  
(b) Differentiate between initiating explosive, booster explosive and incendiaries. (10 marks)

***END OF QUESTION PAPER!!!***