NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCES

DEPARTMENT OF APPLIED CHEMISTRY

PROJECT DEVELOPMENT AND MANAGEMENT

SCH 4210

End of Semester Examination Paper

December 2014

This examination paper consists of 4 pages

Time Allowed: 3 hours

Total Marks: 100

Special Requirements:

Examiner's Name: Mr Donatus Dube

INSTRUCTIONS

1. Answer any four (4) questions
2. Each question carries 25 marks
3. Use of calculators is permissible

MARK ALLOCATION

QUESTION	MARKS
1.	**25**
2.	**25**
3.	**25**
4.	**25**
5.	**25**
TOTAL	**100**

1. a) Using relevant process flow diagrams explain how methane gas can be produced using organic matter in a rural setting in Zimbabwe. (10 marks)

   b) What are the control parameters in this process and explain how each parameter is controlled. (7 marks)

   c) Explain the process of bright annealing of steel (use sketches) (5 marks)
   d) Write a balanced general equation of the conversion of syngas to alkanes in the Fischer–Tropsch process. (3 marks)

2. a) Explain three hazards that sulphur miners may be exposed to. (6 marks)
   b) How should the hazards you mentioned in a) above be minimized in order to safe guard the health of the sulphur miners. (6 marks)

   c) With the help of illustrations explain the meaning of nanoscience and the areas of its application. (8 marks)
   d) Using illustrations account for the reaction thermodynamic considerations in the construction of SO_2 to SO_3 converter. (5 marks)

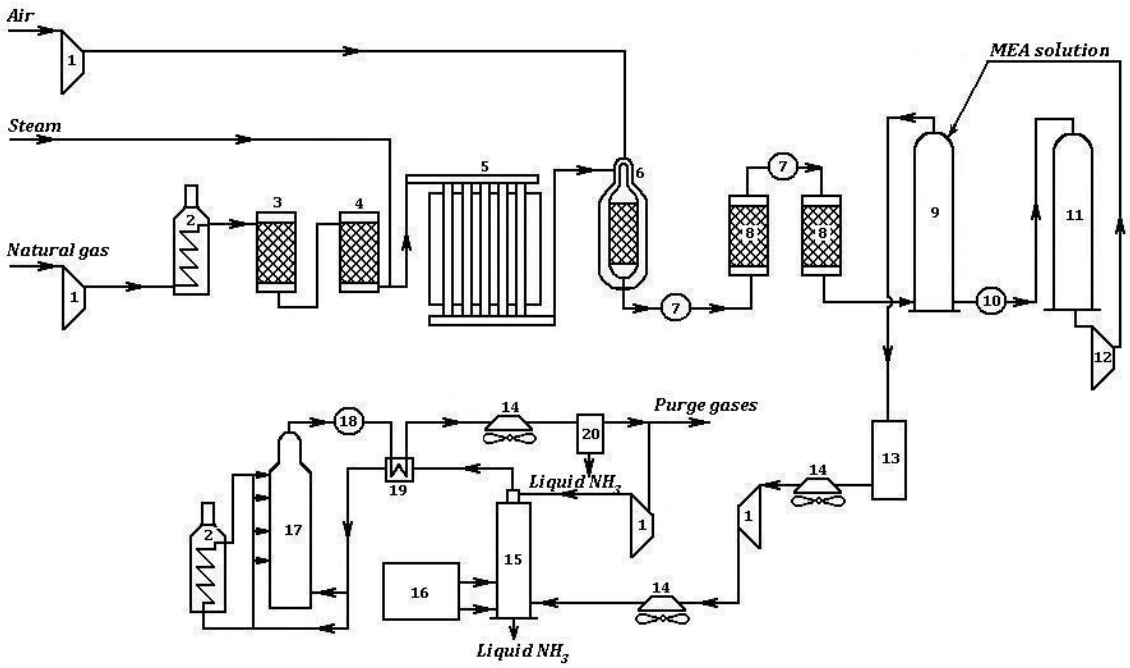
3. a) Draw a labeled process flow chart for the manufacture of phosphoric acid from phosphate rock. (11 marks)
   b) Explain the following processes:
      i) Nodulizing of phosphate rock (4 marks)

      ii) Conversion of phosphate rock to ferro-phosphorus (6 marks)

      iii) Conversion of phosphorus to phosphoric acid (4 marks)

      (*Include relevant process reaction equations*).

4. a) Label the following flow chart and explain the processes taking place at each stage. (10 marks)



b) Explain the effect of the following on the absorption of NO_2 in water to form HNO_3

- temperature
- pressure
- concentration (9 marks)

c) State the uses of the following industrial products:

- urea
- mono ethanol amine
- oleum (6 marks)

5. a) Define ceramics (2 marks)

b) Give two examples of each of the following ceramics

- Structural clay products
- White wares
- Refractories
- Glasses
- Abrasives
- Cements
- New ceramics
- Super conductors (16 marks)

c) Using a process flow chart explain the enameling process of cast iron bath tubs.

(7 marks)

End of question Paper!!!