

King Fahd University of Petroleum & Minerals
Chemical Engineering Department

CHE 425 - Engineering Economics and Design Principles

(Term 081)
1st Major Exam.

Name _____

ID # _____

Time allowed: **100 minutes**
Instructor: Dr. Nadhir A. Al-Baghli

Question #	Max. Numbers	Obtained
1	30	
2	30	
3	10	
4	10	
5	20	
Total	100	

November 24, 2008

Q1 (30 points)

Define the following terms

Process flow diagram

Process topology

Plot plans and elevation diagrams

Overall Conversion

Profit Margin

Adiabatic Mixer

Reactant primary flow path

Heuristics

Utility

Product Specification

- d) What are the major steps that should be decided when a new process is constructed?
- e) Name and discuss three factors that should be considered when deciding between batch and continuous process.
- f) Name at least three items related to the process reactions that should be considered in the early design of the reactor block.

Q3 (10 points)

Explain the meaning of the following symbols

1) mps

2) fg

3) cw

4) TIC

5) C-203 A/B

6) P-304 A/B

7) V-101

8) LAH

9) LCV

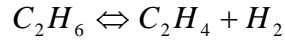
10) PY

Q4 (10 points)

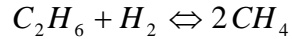
How many distillation columns are usually required to purify a stream containing three components into three pure products? Sketch two possible sequences (configurations) and state below each sketch the possible reasons to select that sequence.

Q5 (20 points)

Ethylene is produced via the thermal cracking of ethane according to the reaction:



The following undesired reaction also takes place



Steam is continuously injected with the feed to prevent severe cracking of the hydrocarbons. The single pass conversion is 80 % and the selectivity is 90 %. The reactions take place at low pressure and extremely high temperature. Ethylene is produced at a rate of 500,000 kg/day.

- a) Construct a simple input-output diagram for the above process.
- b) Construct a simple BFD for the process.
- c) Calculate the profit margin of the process.

Component	MW	Price (\$/kg)
C ₂ H ₆	30	0.30
C ₂ H ₄	28	0.60
CH ₄	16	0.30
H ₂	2	0.70