

**BITS, PILANI- DUBAI CAMPUS**  
**DUBAI INTERNATIONAL ACADEMIC CITY**  
**SECOND SEMESTER 2010-2011**  
**Third Year Chemical Engineering**  
**Comprehensive Examination**  
(Closed Book)

**Course No.: CHE C322**

**08.06.11**

**Max. Marks: 80**

**Course Title: Chemical Process Technology**

**Maximum Time: 3 hours**

Answer All Questions

1. a) Double Contact Double Absorption (DCDA) process in the production of sulphuric acid is superior to contact process. Justify.  
b) Natural gas (NG) which is pumped out of oil wells undergoes separation of 'heavier fractions' which is liquefied as LPG. Discuss *one* of the routes by which this is done with the help of a flow chart.  
c) Mention any chemical absorber which is used in industries where H<sub>2</sub>S scrubbing is required.  
d) Discuss any one urea production process which follows the recycle method. State any one, major engineering problems faced in it.  

**(4+7+2+7)**
  
2. a) In Portland cement manufacture, dry grinding is preferred over wet grinding. Give reasons.  
b) '*Pulp industry is one of the most polluting one*'. Give the block diagram showing how chemical recovery is done from black liquor (wood digestion liquor). **OR**  
Discuss in detail the Kraft process giving all the reaction conditions up until how pulp is obtained  
c) What is 'choking of coal?' Why is it done?  
d) List some major refinery products other than NG and petrol.  
e) In petroleum industry, discuss catalytic cracking. Include the following points: why is it done, the catalyst used and its regeneration. **(4+5+3+3+5)**
  
- 3 a) How do soaps and detergents differ in their composition?  
b) Soya bean oil is solvent extracted from its crushed seeds. Discuss the process with the help of a flow chart.  
c) Production of biodiesel starting from triglyceride, gives glycerin as by-product. Explain.  

**(3+7+4)**
  
- 4 a) Polymers exhibit various physical properties.  
Give any three distinct properties and give an example in each of these categories.

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b) How is random polymerization different from stereospecific polymerization? How does it improve the process for the production of high density polyethylene?

c) Discuss briefly how Nylon-66 or Nylon-6 resin is synthesized.

**(4.5+5.5+6)**

5 a) Name any two major drug categories (other than antibiotics) and give an example in each.

b) Draw a labeled sketch of a bio fermenter as used in the production of penicillin with all the sensors.

c) List any three chemical intermediates produced from ethylene and give their uses

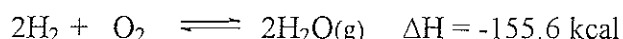
**(2+5+3)**



BITS, PILANI- DUBAI  
DUBAI INTERNATIONAL ACADEMIC CITY  
FIRST SEMESTER 2009-2010  
TEST – I (CLOSED BOOK)

Course No.: CHEM 322                      10.03.11                      Maximum Marks: 25  
Course Title: Chemical Process Technology                      Maximum Time: 50 min

1. a) What is an Unit Operation. Sketch an example.                      (2+1M)
- b) What do you expect when pressure is increased in the following system?



2. a) Discuss briefly how sulfur is extracted using Frasch process.                      (2+3+2M)
- b) Draw the two-stage catalytic converter in sulphuric acid production and discuss the reaction which occur in it and the conditions maintained'
- c) List any two engineering problems faced in sulfuric acid manufacturing process.

3 a) What is the composition of coal gas? Which are the three purification steps of this gas before it can be used? If this gas has to be used for synthesis gas, how is it made free of CO<sub>2</sub> and CO?                      (4+3M)

b) Draw that part of the flow chart when the fractionated Natural Gas (NG) is getting purified of H<sub>2</sub>S contamination.

4 a) In HNO<sub>3</sub> production, the first step of oxidation of ammonia is done under 1 atmos. and at high temperature but the last step is done under high pressure and at low temperature. Discuss.                      (3+3+2M)

b) Draw a block diagram of the recycle process of urea production. Discuss briefly Stamicarbon method.

c) What is the by-product in urea prilling operation; how can it be minimized?

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**SECOND SEMESTER 2010- 2011**

Course Code: CHEM C322 .YEAR Third year  
Course Title: CHEMICAL PROCESS TECHNOLOGY  
Duration: 20 minutes

Date: . 18/05/2011  
Max Marks:14.  
Weightage: 7%

Name: ..... ID No: ..... Sec / Prog: .....

**Answer All Questions.**

1. Give an example each for a: i) Bifuntioanal, ii) Trifunctional monomer. (1M)
  
2. What is the difference between cross-linked and branched polymer. Illustrate using a simple sketch. (1M)
  
3. State the two main modes of polymerization. (1M)
  
4. An example of a polymer which shows the following physical property  
i) Thermo plastic  
ii) Elastomer (2M)
  
5. What is SBR and what is it made up of? (1M)
  
6. Write the full form for:  
i) HDPE  
ii) PVC (1M)
  
7. What is Ziegler catalyst? (1M)
  
  
8. Which type of polymer can be used as textile fiber? (1M)
  
  
9. Give any unique characteristic of pharma industry as compared to a bulk chemical industry. (1M)

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10. Name a drug in the following category:

(1.5M)

- i) Anti-malarial
- ii) Antibiotic
- iii) Anti-TB

11. How does a bioprocess fermenter differ from a regular chemical reactor; give 3 features. (1.5M)

12. What is a downstream process?

(1M)

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*11/29*  
*quiz 2*

**BITS PILANI, DUBAI CAMPUS**

**SECOND SEMESTER 2010- 2011**

Course Code: CHEM C322

YEAR ~~Third~~ year Elective

Date: . 6/04/2011

Course Title: ~~BIOCHEMICAL ENGINEERING~~

*Chemical Process Technology*

MaX Marks:16.

Duration: 20 minutes

Weightage: 8%

Name: ..... ID No: ..... Sec / Prog: .....

**Answer All Questions.**

1. Fats and oils are mixtures of ..... of ..... (1M)
2. Fuller's Earth/Active Carbon is used in vegetable oil extraction processes to ..... (1M)
3. Soya bean oil is preferably obtained in a pure form by ..... extraction. (1M)
4. Finish the equation:  
$$\text{C}_3\text{H}_5 \cdot (\text{OCC}_{17}\text{H}_{33})_3 + \text{H}_2\text{O} \rightarrow$$
 (2M)
5. Hydrogenation is an unit process which is used in oil industry in order to ..... (1M)
6. Source of natural glycerin is ..... and one of the sources of synthetic glycerin is ..... (2M)
7. For the reaction given below, research shows that it has a series of rate processes with *eight* kinetic resistances. Mention any *two*.  
$$\text{Gas}(g) + \text{oil}(l) \rightarrow \text{Fat}(l) \text{ in presence of Ni catalyst.}$$
 (2M)
8. Give two steps to get soap from oils. (2M)
9. Give two uses of soaps and detergents in areas other than in sanitation. (1M)

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10. Biodiesel can be produced from oils and methanol through a process of ..... (1M)

11. What is Interesterification. Give one application as an example. (2M)