

<b>Name:</b>	
<b>Enrolment No:</b>	

**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**

**End Semester Examination, December 2018**

**Course: Engineering Chemistry (CHCE 2004)**

**Semester: III**

**Programme: B. Tech Chemical Engineering**

**Time: 03 hrs.**

**Max. Marks: 100**

**Instructions:**

**SECTION- A**

S. No.	Question	Marks	CO
Q 1	Discuss the role of chemical industries in India?	4	CO1
Q 2	What are the major products of a chloro-alkali industry? Give its uses.	4	CO2
Q 3	What is fermentation? What are the prerequisites for a success fermentation?	4	CO3
Q 4	Describe the classification of Indian paper industry based on “ <i>Chemical Weekly Magazine</i> ”.	4	CO4
Q 5	Discuss the processes involved in production of crude petroleum.	4	CO5

**SECTION- B**

Q 6	Describe in brief the production of soda ash ( $\text{Na}_2\text{CO}_3$ ) by Solvay process. Also, include a properly labelled flow chart and reactions involved, if any. <b>OR</b> Describe in brief the production of ammonia by Haber-Bosch process. Also, include a properly labelled flow chart and reactions involved, if any.	10	CO2
Q 7	What is pulping? Describe in brief the process of sulfate pulping.	10	CO4
Q 8	Describe various factors (with reasoning), which needs to be consider for the choice of crude petroleum before sending it to a refinery.	10	CO5
Q 9	Discuss about the following unit processes along with its uses with respect to chemical industries: (i) Nitration, (ii) Hydrogenation, (iii) Sulfonation, and (iv) Oxidation.	10	CO1

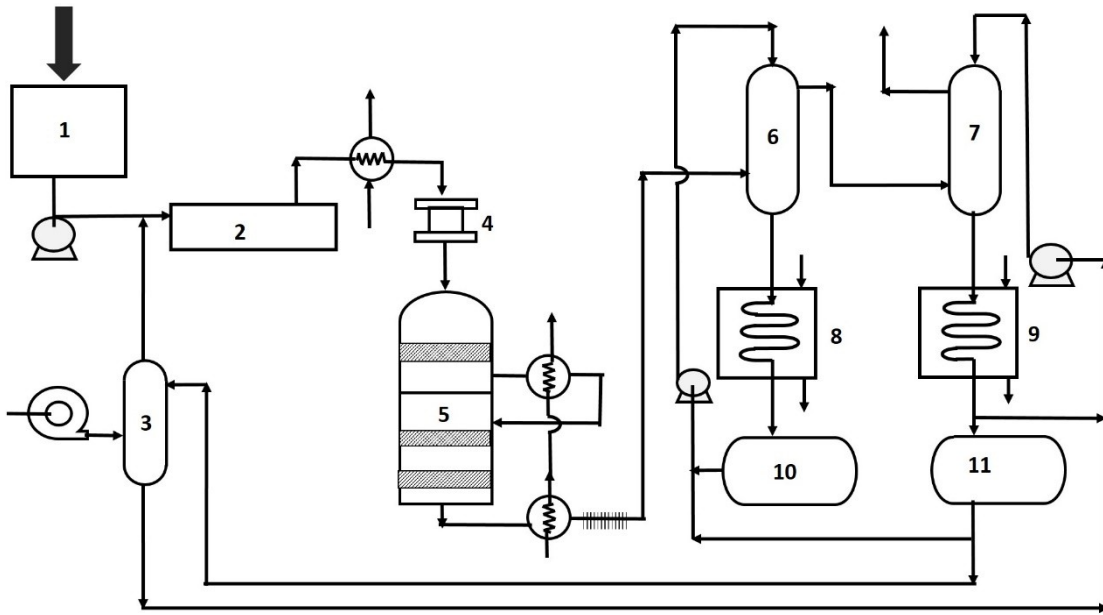
**SECTION- C**

Q 10	(a) Explain the following unit processes with an example and state its role in Indian petroleum refinery and petrochemicals: (i) Alkylation, (ii) Cracking, and (iii) Polymerization. (b) What are the various crude oil products obtained from a petroleum refinery?	15 5	CO5
Q 11	Discuss in brief about the production of ethyl alcohol along with properly labelled flow chart. Your answer should include atleast a minimum of the following points: (i) List of raw materials needed (ii) All unit processes and operations along with working conditions such as temperature, pressure and pH, etc. (iii) Reactions involved and heat exchange points, if any. (iv) Major engineering problems involved in the production process.	20	CO3

OR

Describe in brief about the production of sulfuric acid with the help of the flow chart, shown in **Fig. 1**. Your answer should include atleast a minimum of the following points:

- (i) List of raw materials needed.
- (ii) All unit processes and operations along with working conditions such as temperature, pressure and pH, etc.
- (iii) Identify chemicals flowing “in” and “out” of each unit.
- (iv) Reactions involved and heat exchange points, if any.
- (v) Major engineering problems involved in the production process.



**Fig. 1:** Flow chart for the production of sulfuric acid.

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**SECTION- A**

S. No.		Marks	CO
Q 1	What are the major challenges faced by Indian chemical industries?	4	CO1
Q 2	What are the major engineering problems involved in Haber-Bosch process?	4	CO2
Q 3	What is fermentation? Name atleast four products of fermentation.	4	CO3
Q 4	Describe the classification of Indian paper industry based on “ <i>Chemical Weekly Magazine</i> ”.	4	CO4
Q 5	Describe various types of petroleum refineries.	4	CO5

**SECTION- B**

Q 6	Describe in brief the production of soda ash ( $\text{Na}_2\text{CO}_3$ ) by Dual process (Modified Solvay).  <b>OR</b> Describe in brief the production of nitric acid by Oswald’s process. Also, include a properly labelled flow chart and reactions involved, if any.	10	CO2
Q 7	Describe in the process of paper production by Fourdrinier machine. Also, include a properly labelled flow chart.	10	CO4
Q 8	What are the various composition of crude petroleum? How does the compositions affect the refining process?	10	CO5
Q 9	Discuss about the following unit processes along with its uses with respect to chemical industries: (i) Esterification, (ii) Hydrogenation, (iii) Sulfonation, and (iv) Nitration.	10	CO1

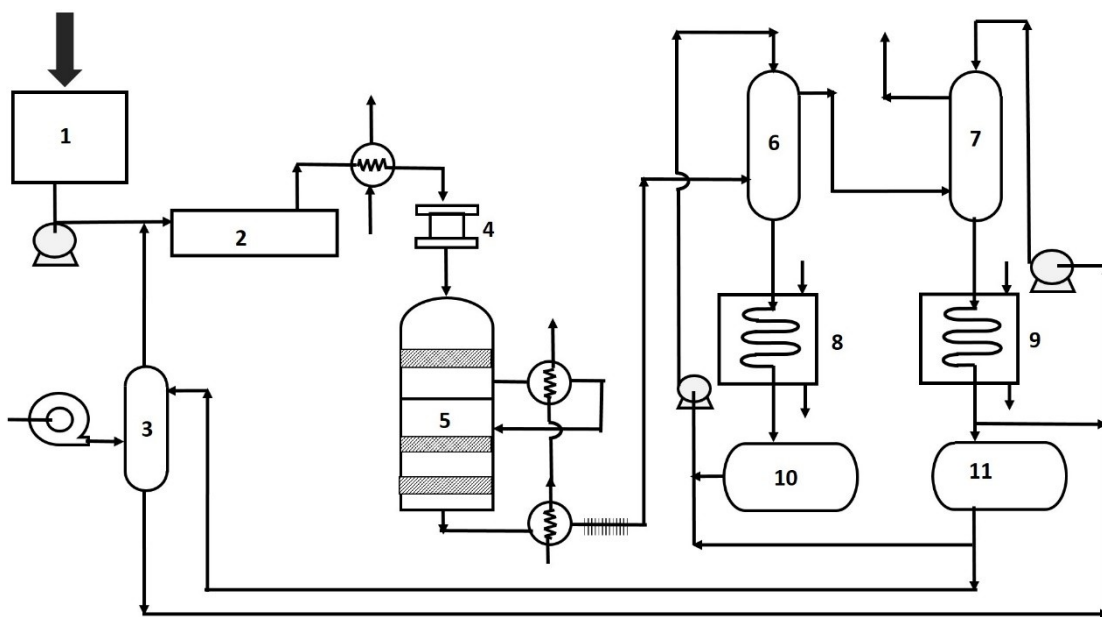
**SECTION- C**

Q 10	(c) Explain the following unit processes with an example and state its role in Indian petroleum refinery and petrochemicals: (i) Isomerization, (ii) Cracking, and (iii) alkylation. (d) What are the various crude oil products obtained from a petroleum refinery?	15 5	CO5
Q 11	Discuss in brief about the production of ethyl alcohol along with properly labelled flow chart. Your answer should include atleast a minimum of the following points: (i) List of raw materials needed (ii) All unit processes and operations along with working conditions such as temperature, pressure and pH, etc. (iii) Reactions involved and heat exchange points, if any. (iv) Major engineering problems involved in the production process.	20	CO3

OR

Describe in brief about the production of sulfuric acid with the help of the flow chart, shown in **Fig. 1**. Your answer should include atleast a minimum of the following points:

- (i) List of raw materials needed.
- (ii) All unit processes and operations along with working conditions such as temperature, pressure and pH, etc.
- (iii) Identify chemicals flowing “in” and “out” of each unit.
- (iv) Reactions involved and heat exchange points, if any.
- (v) Major engineering problems involved in the production process.



**Fig. 1:** Flow chart for the production of sulfuric acid.