

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

**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**  
**End Semester Examination, December 2019**

**Course:** Petroleum Refining Technology (Elective)

**Semester:** 5

**Program:** B. Tech (Chemical Engineering)

**Time:** 03 hrs.

**Course Code:** CHCE 3010

**Max. Marks:** 100

**Instructions:**

**SECTION A**

S. No.	Question	Marks	CO
Q 1	What is cetane number? If a fuel has a cetane number of 50, what does it indicate?	4	CO1
Q 2	What are the feedstock (s) for delayed coking unit (DCU) and the products obtained from DCU?	4	CO2
Q 3	In diesel desulfurization unit, which one of the two separators, i.e. low or high-pressure separator is placed before the other? Give a short reasoning.	4	CO3
Q 4	Give four applications of carbon black.	4	CO4
Q 5	Illustrate the importance of petroleum product blending.	4	CO5

**SECTION B**

Q 6	Explain in detail about the evaluation of crude oil based on (a) U.S. Bureau of mines using API gravity as the parameter, and (b) Watson characterization factor.  <p style="text-align: center;"><b>OR</b></p> Describe in brief about the effect on the refinery processes due to presence of (a) sulfur compounds, and (b) aromatics, in the crude oil.	10	CO1
Q 7	(a) Illustrate the role of catalytic reforming process in a refinery. (b) What is alkylation process w.r.t. petroleum refinery? Illustrate its role.	5 5	CO3
Q 8	(a) Which unit in refinery produces coke? Mention four industrial applications of coke. (b) What are the unit processes/ operations involved in solvent extraction process for production of lube oil base stock?	5 5	CO4
Q 9	(a) For a blend of alkylate $C_4 =$ , coker gasoline, and FCC gasoline. Calculate the octane number blending index of the blend by using linear mixing of octane number indices. Properties and quantities of the components are given in <b>Table 1</b> :  <b>Table 1:</b> Blending index for various gasoline components.	5	CO5

	<b>Component</b>	<b>Quantity (BPD)</b>	<b>Blending index, <math>BI_{ONi}</math></b>		
	<b>Alkylate C<sub>4</sub> =</b>	6000	67.66		
	<b>Coker gasoline</b>	4000	53.65		
	<b>FCC gasoline</b>	5000	58.78		
	<b>(b) Give atleast four safety measures to ensure during the operation in an atmospheric distillation unit (ADU).</b>			<b>5</b>	
<b>SECTION C</b>					
<b>Q 10</b>	Describe in details about the propane deasphalting process for production of lube oil base stock, with a properly labelled flow chart. Your detailed answer should atleast contain the following points:  (i) Objective of the process (ii) Operating temperature (s) and pressure (s), and pretreatment of feed, if any, (iii) Feed stock and the product (s).			<b>20</b>	<b>CO2</b>
<b>Q 11</b>	Explain in detail about the fluidized catalytic cracking (FCC) unit in a petroleum refinery, with a properly labelled flow chart. Your detailed answer should atleast contain the following points:  (i) Description of the whole unit processes and operations in brief, (ii) Temperature and pressure, pretreatment of feed, if any, (iii) Feed stock and the product streams,  <b>OR</b>  Write a detailed description about the two-stage hydrocracking unit in a petroleum refinery, with a properly labelled flow chart. Your detailed answer should atleast contain the following points:  (i) Description of the whole unit processes and operations in brief, (ii) Temperature and pressure, pretreatment of feed, if any, (iii) Feed stock and the product streams,			<b>20</b>	<b>CO3</b>