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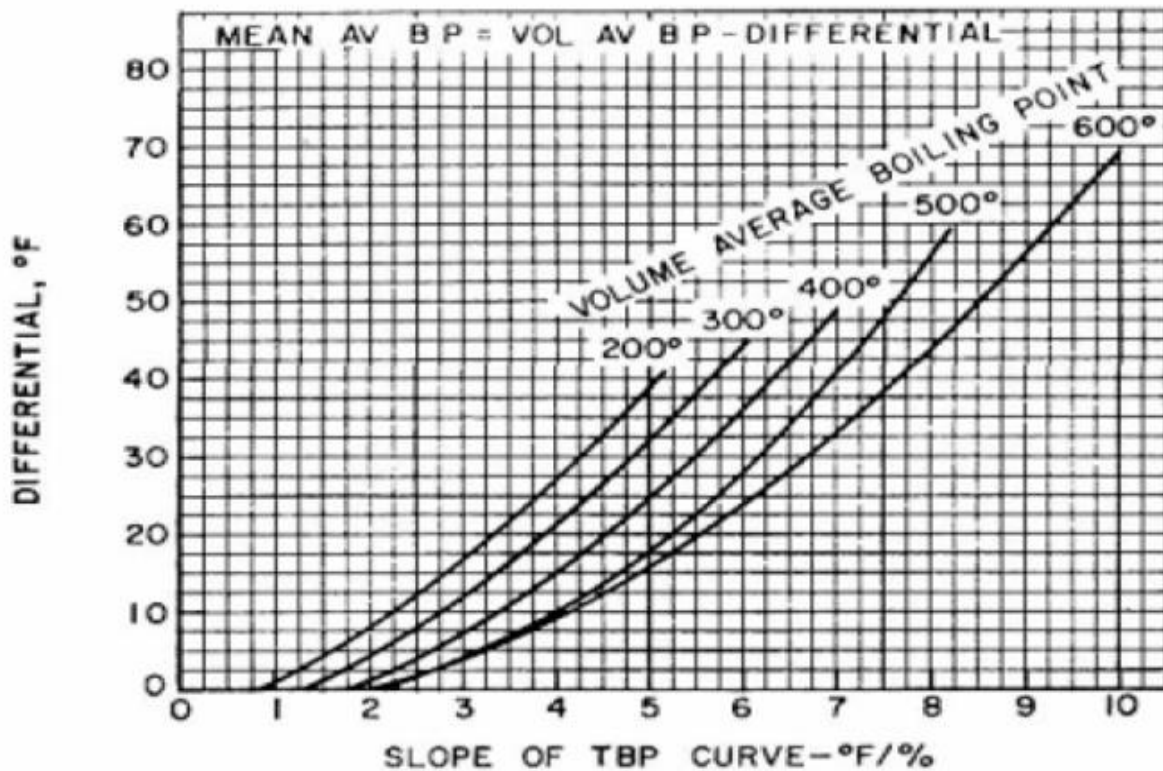
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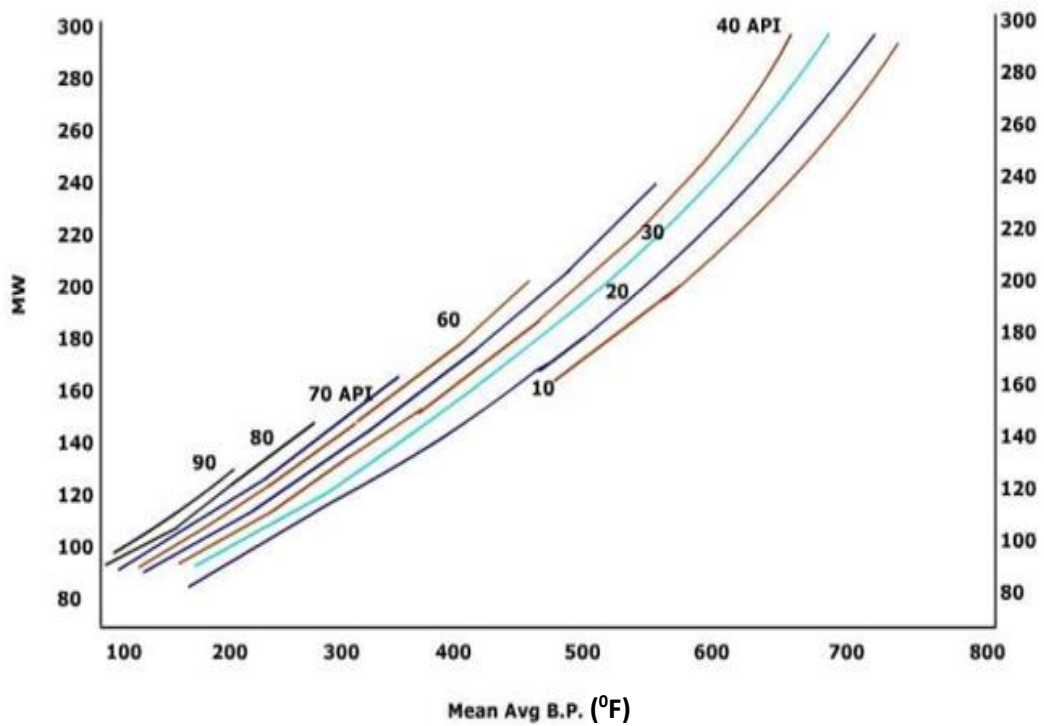
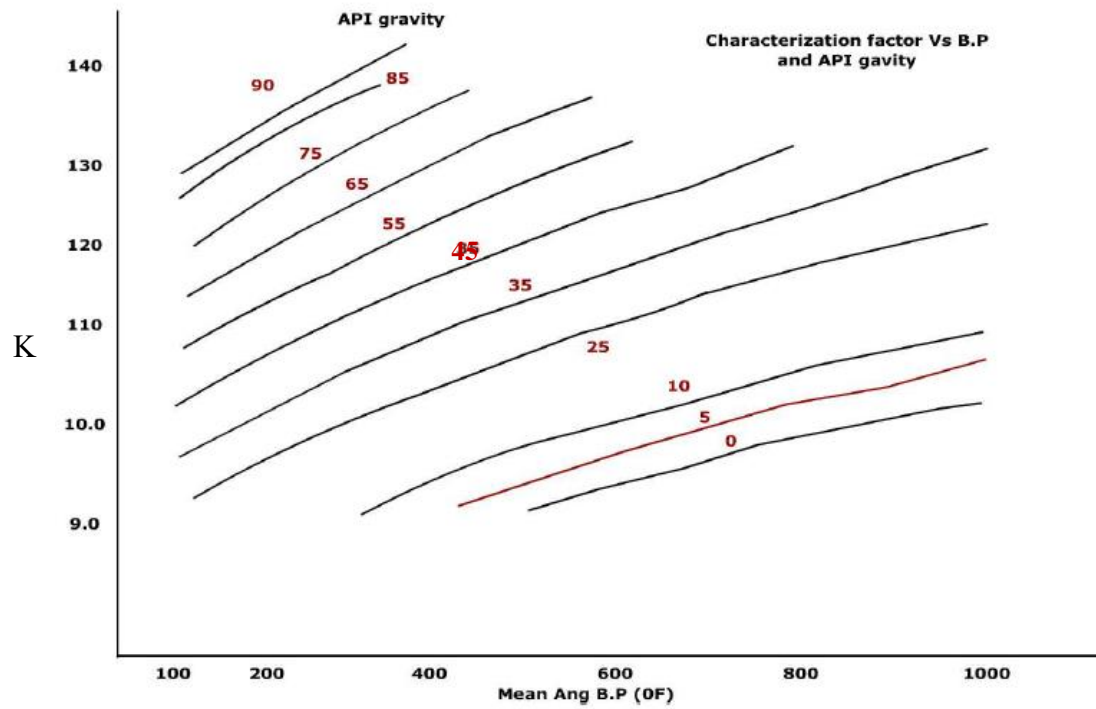
**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**
**End Semester Examination, December 2021**
**Course: Petroleum Refining & Petrochemical Technology**
**Semester: V**
**Program: B.Tech (APE Gas)**
**Time 03 hrs.**
**Course Code: CHGS 3013P**
**Max. Marks: 100**
**Instructions: In case of data missing make necessary assumptions**
**Note: The graphical data is provided in Page No. 2 & 3 to solve problem no. 10**
**The table 1 is provided in page 4 to solve problem no. 9**

S. No.	SECTION A (5X4=20) (Attempt all questions)	Marks	CO										
Q 1	What is the difference between ASTM and TBP distillation and give their significance?	4 M	CO1										
Q 2	Explain and give the significance of octane number and cetane number?	4 M	CO2										
Q 3	List the various types of reflux conditions? Which reflux condition is the best for Indian industries and also mention the merits of the pump around reflux over the top reflux?	4 M	CO3										
Q 4	What is hydrocracking and what are the various process variables affecting hydrocracking?	4 M	CO4										
Q 5	What is coking? what are the types of coking operations?	4 M	CO4										
S. No.	SECTION B (4X10=40) (Attempt all questions)	Marks	CO										
Q 6	(a) What is delayed coking and show it with a schematic representation (b) what are the various coke types and characteristics of delayed coking process?	(5+5) M	CO5										
Q 7	(a) What is visbreaking and what are the types of visbreaking operations? (b) Explain the reactions involved in visbreaking and the differences between the various visbreakers?	(5+5) M	CO4										
Q 8	Explain the catalytic reforming process regarding the following points a) Objective b) Feedstock c) Catalyst used d) Major Reactions e) Process Conditions	10 M	CO4										
Q 9	(a) Calculate the RVP of a blend of LSR gasoline, HSR gasoline, Reformate and FCC gasoline. The component and quantity in barrel per day (BPD) are given below <table border="1" data-bbox="651 1682 1233 1877"> <thead> <tr> <th>Component</th> <th>Quantity (BPD)</th> </tr> </thead> <tbody> <tr> <td>LSR gasoline</td> <td>5000</td> </tr> <tr> <td>HSR gasoline</td> <td>4000</td> </tr> <tr> <td>Reformate 94 RON</td> <td>6000</td> </tr> <tr> <td>FCC gasoline</td> <td>7000</td> </tr> </tbody> </table> Properties of the components are given in Table 1.  (b) Determine the amount of n-butane required to produce a gasoline blend with RVP = 10 psi to the components listed above in (a)?	Component	Quantity (BPD)	LSR gasoline	5000	HSR gasoline	4000	Reformate 94 RON	6000	FCC gasoline	7000	(5+5) M	CO5
Component	Quantity (BPD)												
LSR gasoline	5000												
HSR gasoline	4000												
Reformate 94 RON	6000												
FCC gasoline	7000												

**SECTION C (2X20=40M) (Attempt all questions)**

Q 10	Whole crude TBP data (API gravity 25)							20 M	CO2
	Vol. %	0	10	30	50	70	90		
	T (°F)	160	220	350	415	460	530		
	(i) Plot the TBP and determine the UOP characterization factor, average boiling point (VABP, MEABP), and weight for the crude oil. (ii) For the TBP range of 220-500 °F, calculate API, M.W, Mid vol.%, Mid boiling point, and Wt based on 500 barrels of whole crude.								
Q 11	With a neat flow diagram, explain the process of Flexi coking. Also, write the merits and demerits of Flexi coking over the other two coking processes.							20 M	CO4





**Table 1: Typical properties for gasoline blending components**

Component	RVP (psi)	MON	RON	API
<i>i</i> C <sub>4</sub>	71.0	92.0	93.0	
<i>n</i> C <sub>4</sub>	52.0	92.0	93.0	
<i>i</i> C <sub>5</sub>	19.4	90.8	93.2	
<i>n</i> C <sub>5</sub>	14.7	72.4	71.5	
<i>i</i> C <sub>6</sub>	6.4	78.4	79.2	
LSR gasoline	11.1	61.6	66.4	78.6
HSR gasoline	1.0	58.7	62.3	48.2
Light hydrocracker gasoline	12.9	82.4	82.8	79.0
Heavy hydrocracker gasoline	1.1	67.3	67.6	49.0
Coker gasoline	3.6	60.2	67.2	57.2
FCC Light gasoline	1.4	77.1	92.1	49.5
FCC gasoline	13.9	80.9	83.2	51.5
Reformate 94 RON	2.8	84.4	94.0	45.8
Reformate 98 RON	2.2	86.5	98.0	43.1
Alkylate C <sub>3</sub> <sup>=</sup>	5.7	87.3	90.8	
Alkylate C <sub>4</sub> <sup>=</sup>	4.6	95.9	97.3	70.3
Alkylate C <sub>5</sub> <sup>=</sup>	1.0	88.8	89.7	