BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: B.TECH. **SEMESTER : V**
BRANCH: CHEMICAL ENGINEERING **SESSION : MO/2024**

SUBJECT: CL321 PETROLEUM REFINERY ENGINEERING

TIME: 3 HOURS **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Distinguish ASTM and TBP distillation process through salient points and explain how to estimate % petrol & % kerosene by volume from typical ASTM curve	[5]	1	4
Q.1(b)	Explain the importance of the following properties: Pour & cloud point, Aniline point, Octane no., Smoke point & RVP and also name the simplest test carried out for any crude oil as the initial test	[5]	1	2
Q.2(a)	Summarize the objectives & names of reactions taking place in Catalytic reforming process and explain a catalytic reforming process that combines thermal reforming & other processes in an integrated catalytic reforming process with flowsheet.	[5]	3	2
Q.2(b)	Illustrate a neat schematic of Atmospheric distillation unit and examine the functions of its components & list the process parameters of 'Pt' based isomerization process and '$AlCl_3$' based isomerization process	[5]	2,3	4
Q.3(a)	Estimate wt% gasoline yield & volume% gasoline yield in a coking process, if wt% CCR is 13.5%, ^{0}API is 9.4. Illustrate flowsheet of delayed coking method and list the reasons for why it is named as delayed coking.	[5]	4	5
Q.3(b)	List the advantages & disadvantages of Soaker Visbreaking process and illustrate generalized flowsheet of hydrotreating process & schematic figure of hydrotreating reactor	[5]	4	2
Q.4(a)	Analyze the need for dual function catalyst in hydrocracking process with examples and outline the complimentary nature of the process. Also, summarize Ebullient bed reactor process for hydrocracking with flowsheet & details	[5]	4	4
Q.4(b)	Determine time of cracking & activation energy of a FCC process, if reaction rate constant is 2.174×10^{-4} s, % gasoline is 31%, T = 725 K & C = 30. List the functions of reactor, riser & regenerator in a FCC process.	[5]	4	5
Q.5(a)	Explain the main objective of alkylation process with an example reaction & illustrate schematics of H_2SO_4 cascade reactor alkylation, autorefrigeration alkylation & H.F. Alkylation	[5]	3	2
Q.5(b)	Outline the chemical equations & salient points of H_2 production by Autothermal reforming. Also, interpret the effect of ΔT of stocks in flash point blending, ASTM criteria for mixing stocks in viscosity blending & write the equation linked to octane number blending	[5]	3,5	2

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