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

CLASS: BE **SEMESTER : IV**
BRANCH: CHEMICAL **SESSION : SP/19**

SUBJECT: CL4003 PETROCHEMICALS AND REFINERY ENGINEERING

TIME: 3:00 HOURS **FULL MARKS: 60**

INSTRUCTIONS:
1. The question paper contains 7 questions each of 12 marks and total 84 marks.
2. Candidates may attempt any 5 questions maximum of 60 marks.
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.

Q.1(a) Briefly describe true boiling point (TBP) distillation method for the evaluation of crude oil. [4]

Q.1(b) Estimate the atmospheric TBP distillation temperatures for a petroleum fraction having an experimental simulated distillation (SD) as given in the following table. [8]

% distilled	5	10	30	50	70	90	95
SD temp., F	293	305	324	336	344	359	369

Use the following relation:

$$W_i = CV_i^D$$

Where, W_i = TBP temperature difference between two cut points (°F), V_i = SD temperature difference between two cut points (°F). C,D = constants varying for cut point ranges which can be find from the below table:

i	Cut Point Range	*C*	*D*
1	100% - 95%	0.02172	1.9733
2	95% - 90%	0.97476	0.8723
3	90% - 70%	0.31531	1.2938
4	70% - 50%	0.19861	1.3975
5	50% - 30%	0.05342	1.6988
6	30% - 10%	0.011903	2.0253
7	10% - 5%	0.15779	1.4296

Q.2(a) Describe the following terms: (1) Octane number (2) Cetane number. [2]

Q.2(b) Explain the working principle of steam ejectors with schematic diagram. [4]

Q.2(c) Draw process flow diagram of atmospheric distillation unit (show the following: desalter, atmospheric distillation column, pump arounds and side-strippers). Also mention the boiling point range of different products. [6]

Q.3(a) What are the different types of cokes produced in delayed coker unit? Write their uses. [2]

Q.3(b) What are the different decoking operations in delayed coker unit? [4]

Q.3(c) Describe reactor-regenerator section of fluidized catalytic cracking unit with neat flow sheet. [6]

Q.4(a) What are the objectives of Hydrotreating processes? [2]

Q.4(b) Write a short note on the catalyst used in hydrocracking processes. [4]

Q.4(c) Describe one-stage hydrocracking process with neat flow sheet. [6]

Q.5(a) List the various products manufactured from ethylene and write their uses. [2]

Q.5(b) What is heat transfer fluid (HTF)? Write the desired properties of HTF. [4]

Q.5(c) Describe the manufacturing process of ethylene oxide from ethylene with process flow diagram. [6]

Q.6(a) What is UOP Tatoray process? Write the reaction(s) involved in this process. [2]

Q.6(b) Why hydrotreating of pyrolysis gasoline is required? Write the uses of PyGas. [2]

Q.6(c) Describe the integrated UOP aromatics complex for the production of aromatics (BTX) from naphtha with process flow diagram. [8]

Q.7(a) What are the major finished products (at least 03) of styrene? Write their uses. [2]

Q.7(b) What is Hock process? Write the reaction(s) involved in this process. [4]

Q.7(c) Describe the manufacturing process of cumene from benzene with process flow diagram. [6]

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