**BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI**

First Semester 2022-2023(10-10-2023)

Mid-Semester Test **PART A: (CB) 36 marks; Part B (OB) 14 marks. suggested time for A is 60min, for B is 30 min.**

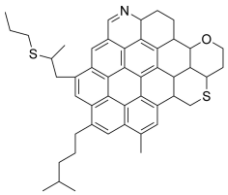
Course No. : CHE F422 Total time: 90 min

Course Title: PETROLEUM REFINING TECHNOLOGY Total Marks: 50

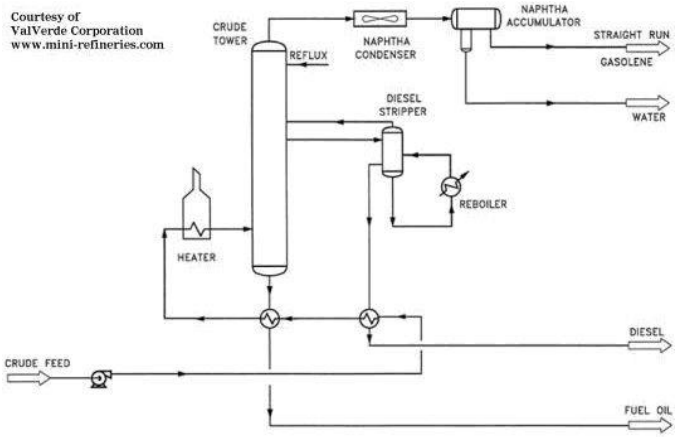
**Name:** **ID:**

**INSTRUCTIONS:** 1. ***Answer all questions of Part A on the question paper itself, and only in the space provided just under the question (otherwise It will not be evaluated). Use answer book for roughwork and planning. Answer in phrases with key words, do not use long sentences.***
*2. Part B must be answered in answer booklet provided **only** after Part A is submitted. Textbook and hand notes are allowed.*
**3. Exam malpractice will immediately be communicated to AUGSD**

**Q1[1+3]**. (a) Name the naturally occurring black or brown Bituminous components which are (i) insoluble in common organic solvents (ii) insoluble in carbon disulfide. (b)What is in the picture below? Give common characteristics, significance and end use.




**Q2[1+3]**. (a) briefly describe how EFV distillation curve is obtained from lab. (b). Below is the simplified ADU flow sheet. Where in the flowsheet can this EFV data be applied to design the process? Explain your reasoning clearly.

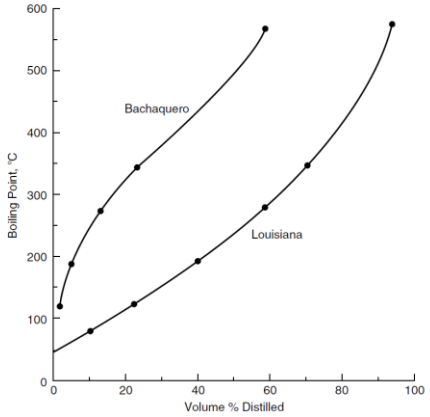



**Q3[1+3]**. What is *circulation system* and its purpose in drilling operation? Suppose there is a sudden significant increase in "mud" flow during drilling. What is the most common cause and the remedy? Explain with reasoning.

**Q4[1+3].** Name the basis of the crude oil classification that results in Paraffinic/Naphthenic/mixed oils? *Professor Peter Odell, expert on petroleum, suggested that by 2100, the oil industry will be larger than in the year 2000 but up to 90% dependent on unconventional crude oils, specifically with more resin, aromatics and bituminous content.* **So which classification is well suited for this future scenario?** You must give clear reasoning for credit.

**Q5[1+3]**. What is a basic petroleum trap? Imagine this starting condition: carbonaceous reefs (porous rock) are covered over by caprock sandstone. Adjacent to this a huge lake or sea backwater evaporates over geological**. Explain step by step and draw, how a trap can form over time from this starting condition.**

**Q6[1+2+1]** The TBP data of two crudes are shown below. Distillation was stopped when the material became so thick that further distillation was more likely to break bonds. Hence data till 100% volume could not be obtained. (a)Suggest how to get the remaining distillation data. With reference to the TBP data answer with proper justification: (b) Which crude is likely to produce more "lubricating fraction"? Justify by drawing molecular structure (c) Which crude will likely have more Sulphur in residua (Material boiling over 500$^{o}$C)? *No credit for only naming the crude.*




**Q7[1+3]**. What does a TBP overlap represent in crude distillation, that has its parallel in binary distillation? How do the numerical values of TBP overlap (do not consider sign) relate to the corresponding ASTM gaps for various separations. Relate this to the distillation experiment being carried out in each case.

**Q8[4] (a)** Once oil is confirmed to exist by a drill bore test, which exploration method/s can estimate the 'quantity' of oil present and based on what?

**Q9. [2+2]** What roles do the following play in organic theory mechanism of crude formation? Give the immediate products that their action produces (i) phytobacteria (ii) anerobic bacteria.