



**NATIONAL OPEN UNIVERSITY OF NIGERIA PLOT 91, CADASTRAL ZONE,  
NNAMDI AZIKIWE EXPRESSWAY, JABI – ABUJA  
FACULTY OF SCIENCES  
DEPARTMENT OF CHEMISTRY  
2025\_2 EXAMINATIONS**

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**COURSE CODE: CHM 311**

**COURSE TITLE: PETROLEUM CHEMISTRY**

**COURSE UNIT: 2**

**TIME: 2 HRS**

**INSTRUCTION: Answer question one (1) and any other two questions**

**QUESTION 1**

1(a) (i) Explain the process of catalyst regeneration in FCC units. **(3 marks)**

(ii) Define Autochthonous and Allochthonous. **(3 marks)**

b Why is continuous regeneration preferred over semi-regenerative systems in modern refineries? **(12 marks)**

1c. Compare and contrast the biogenic and abiogenic theories of petroleum origin **(12 marks)**.

**QUESTION 2**

2a. What is the difference between catalytic cracking and hydrocracking? **(10 marks)**

2b. Explain the significance of catalytic cracking and hydrocracking in modern petroleum refining. How do these processes differ? **(7 marks)**

2c. what are their respective advantages and applications? **(3 marks)**

**QUESTION 3**

3a. Describe the following key stages in the process of petroleum generation: **(14 marks)**

(i) Accumulation of organic matter **(2 marks)**

(ii) Burial and heat **(4 marks)**

(iii) Transformation without oxygen **(3 marks)**

(iv) Migration and trapping **(3 marks)**

(v) Preservation in reservoirs **(2 marks)**

3b. Explain the role of natural gas in various industrial applications beyond power generation **(3marks)**

3c. What is the significance of casing in the drilling of an oil well? **(3 marks)**

**QUESTION 4**

4a. Classify crude oil based on hydrocarbon composition **(10 marks)**.

4b. What are the environmental and economic implications of refining high-sulfur versus low-sulfur crude oil? **(6 marks)**

4c. What are methane hydrates and why are they significant in natural gas exploration? **(4 marks)**

**QUESTION 5**

5a. Explain the formation process of natural gas and differentiate between associated and non-associated gas. **(5 marks)**.

5b. Define the following: (i) diagenesis (ii) catagenesis (ii) metagenesis **(6 marks)**

5c. Discuss the stages involved in 5b above in the context of sedimentary organic matter transformation **(9 marks)**