



**NATIONAL OPEN UNIVERSITY OF NIGERIA**  
PLOT 91, CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESSWAY, JABI - ABUJA  
**FACULTY OF SCIENCES**  
**DEPARTMENT OF PURE & APPLIED SCIENCES**  
**OCTOBER/NOVEMBER 2019-2 EXAMINATION**

**COURSE CODE: CHM 311**

**COURSE TITLE: PETROLEUM CHEMISTRY**

**CREDIT: 2 UNIT**

**TIME ALLOWED: 2 HOURS**

**INSTRUCTION: Answer Question 1 and any 3 Questions**

**QUESTION 1**

- a) The odorless nature of natural gas is the reason why the gas leaking cannot be detected by the producer and end users. Explain how this challenge can be overcome. ( 4 marks)
- b) Mention four non-hydrocarbon compounds found in crude oil. ( 4 marks )
- c) Explain the following terms: (i) Salt content, (ii) Sulphur content (iii) Ash content. ( 8 marks marks )
- d) List the major classes of crude oil. ( 3 marks )
- e) Mention two plausible methods for developing the deepwater non-associated gas fields. (2 marks)
- f) Write the chemical equation for main stream reforming reactions. (4 marks)

**QUESTION 2**

- a) Explain the generation of crude from biomass (5 marks)
- b) Write short note on Organic Source Materials (4 marks)
- c). Explain in detail the origin and formation of biogas. (6 marks)

**QUESTION 3**

Explain the following:

- i) Autochthonous (5 marks)
- ii) Allochthonous (5 marks)
- iii) Explain in detail the composition of crude oil. (5 marks)

**Question 4**

- a) Outline two of each of the following components of crude oil; **(6 marks)**
  - i) Aromatic hydrocarbons
  - ii) Cycloparaffins (Naphthenic)
- b) List and draw the structure of four important non-hydrocarbon compounds occurring in crude oil **(6 marks)**
- c) Define the term Catagenesis. **(3 marks)**

**Question 5**

- a) Explain the following in the acid gas treatment of natural gas **(10 marks)**
  - i) physical absorption
  - ii) physical adsorption
- b) Write the full meaning of FCC and outline three desirable properties of an FCC catalyst **(5 marks)**