CRAWFORD UNIVERSITY
COLLEGE OF NATURAL AND APPLIED SCIENCES
DEPARTMENT OF EARTH AND PHYSICAL SCIENCE
INDUSTRIAL CHEMISTRY UNIT
HARMATTAN SEMESTER EXAMINATION 2013/2014 SESSION

COURSE CODE: ICH 447
COURSE TITLE: PETROLEUM CHEMISTRY
TIME ALLOWED: 2 HOURS 3UNITS
DATE: FEBRUARY, 2014
INSTRUCTIONS: ANSWER ALL QUESTIONS IN SECTION A AND TWO(2) QUESTIONS IN SECTION B

SECTION A

1. (a) (i) With the aid of chemical reaction only, describe the manufacture of anionic detergent.
(ii) Write and explain the performance number's formula.
(iii) What is the essence of hydrocracking and hydroalkylation in petroleum processing.
(iv) What is mixed crude?

(b) (i) Separation in the refinery involves removal of crude oil impurities. There are 5 techniques that can be used in the separation of crude oil in into different components. Explain how each of these techniques can be applied in the separation process.
(ii) Why must metallic compounds be removed from crude oil.
(iii) Mention 5 common metals in crude oil.

SECTION B

2. (a) (i) What is petroleum?
(ii) Differentiate between bicycloparaffins and aromatic hydrocarbons
(iii) Give detailed explanation of what is referred to as n – paraffin hydrocarbons.
(iv) Specific gravity or density is useful in determination of quality of crude oil. Explain?
(b) Hydrocarbon compounds in petroleum are categorized into various types. Draw one structural example of each of the petroleum hydrocarbons.
(i) N – paraffin hydrocarbon (ii) Iso – paraffin hydrocarbon (iii) Branched paraffin Hydrocarbon (iv) Cycloparaffin hydrocarbon (v) Bicycloparaffin (vi) Aromatic cycloparaffin hydrocarbon (vii) Binuclear paraffin (viii) (c) Give 4 examples and chemical structures of each of the following components of petroleum crude; (i) sulphur compounds (ii) nitrogen compounds.

3. (a) Account for the following tests in petroleum refinery: (i) Pour point (ii) Carbon residue test (iii) Ash content (iv) Flash point (v) Aniline point (vi) What is the importance of wobbe index to heating value?

   (b) (i) Differentiate between dry natural gas and wet natural gas.

   (ii) State the reason why wet natural gas must be trated.

   (iii) In a tabular form, what are the differences between catalytic cracking and thermal cracking?

   (c) Explain sequentially how the treatment of wet natural gas is usually carried out in the refinery.

4. (a) Describe the 3 ways by which re – organization serves as one of the important methods of petroleum processing.

   (b) Write short note on: (i) Cycloaliphatics and aromatic s petrochemicals (ii) Inorganic petrochemicals.

   (c) What do you understand by the following terms: (i) visbreaking (ii) coking: as is used in thermal cracking.