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KIBABII UNIVERSITY

**UNIVERSITY EXAMINATIONS
2021/2022 ACADEMIC YEAR**

**THIRD YEAR FIRST SEMESTER
MAIN EXAMINATIONS**

FOR THE DEGREE OF BSC (CHEMISTRY)

COURSE CODE: SCH 315

COURSE TITLE: PETROLEUM AND PETROCHEMICALS

DATE: 19/05/2022

TIME: 2:00PM-4:00PM

INSTRUCTIONS TO CANDIDATES

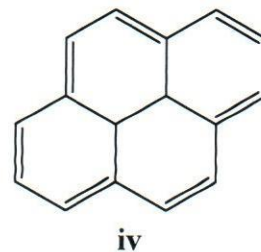
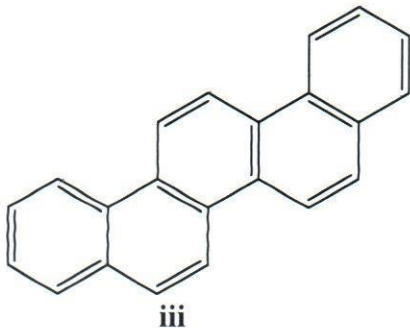
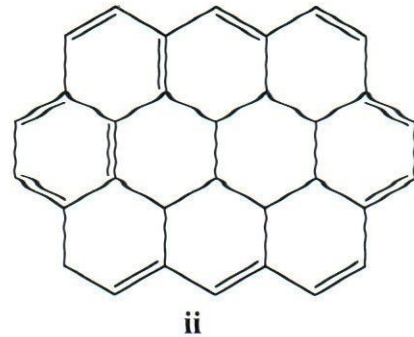
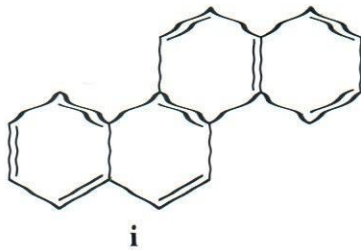
Time: 2 Hours

Answer question ONE and any other TWO of the remaining

KIBU observes ZERO tolerance to examination cheating

QUESTION ONE [30 MARKS]

- a) Define the following terms as used in petroleum industry [5 marks]
- i. Catagenesis
 - ii. Bacterial decomposition
 - iii. Kerogen
 - iv. Stratigraphy
 - v. Neutron log
- b) Bitumen is a mixture of organic liquids that are highly viscous. Name two component of bitumen [2 marks]
- c) Only 5% of scientists believe in inorganic theory of origin of petroleum. Explain why it is such unpopular theory [2 marks]
- d) State four ways in which traces of nonhydrocarbon compounds can impact on the characteristics of finished products [4 marks]
- e) Name the following polycyclic structures that occurs in the higher boiling point of petroleum fractions [4 marks]



- f) Name uses of the following derivative of ethylene [5 marks]
- i. ethylene glycol
 - ii. Ethyl alcohol

- iii. Polyethylene
 - iv. Styrene
 - v. Ethylene dichloride
- g) Petroleum hydrocarbons are usually gaseous and react smoothly in the vapor phase with nitric acid to give mixture of nitro compound. With equations, give compounds produced when the propane reacts with nitric acid **[4 marks]**
- h) Briefly explain the following required conditions for accumulation of petroleum **[4 marks]**
- i. Source rock
 - ii. Reservoir rock
 - iii. Seal rock
 - iv. Geometric arrangement

QUESTION TWO [20 MARKS]

- a. With the help of diagram where possible, discuss factors that cause petroleum to migrate **[8 marks]**
- b. Explain the importance of undertaking the following tasks during oil exploration **[6 marks]**
- i. Oil and gas seeps
 - ii. Collecting data
 - iii. Seismic surveys
- c. Explain composition of vacuum residua fraction of crude oil obtained after distillation **[6 marks]**

QUESTION THREE [20 MARKS]

- a. Name three examples of the following primary petrochemicals **[6 marks]**
- i. Olefins
 - ii. Aromatics
- b. Explain composition of middle distillates fraction during purification of crude oil by distillation **[6 marks]**
- c. Name two uses of natural gas **[2 marks]**
- d. Many chemicals can be produced from the hydrocarbon intermediate methane. Give equations to show how each of the following chemicals can be synthesized from methane **[6 marks]**
- i. Methanol

- ii. Methanol
- iii. Ammonia
- iv. Urea
- v. Hydrazine

QUESTION FOUR [20 MARKS]

- a. Explain the following types of traps using a well labeled diagram **[6 marks]**
 - i. Structural traps
 - ii. Fault traps
 - iii. Salt dome traps

- b. One of the theory of formation of petroleum is organic theory
 - i. Explain this theory in details **[4 marks]**
 - ii. Based on organic theory, explain formation of petroleum **[4 marks]**

- c. Petrochemical ethylene glycol and styrene are synthesized from olefins and benzene, respectively. Using chemical equations explain formation of these petrochemicals **[6 marks]**