

UNIVERSITY OF RUHUNA

BACHELOR OF SCIENCE HONOURS IN FISHERIES AND MARINE SCIENCES DEGREE

Level IV Semester I Examination – August/September 2018

OCG 4122 – Hydrocarbon and Mineral Resources

Time: 2 hours

Answer all Questions in PART A and only Two (2) Questions from PART B

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PART A

1. Limestone reservoir in an oil field in the North Sea has 80% hydrocarbon saturation. Resistivity of the connate water in the North Sea is  $0.002 \Omega$  and deep resistivity log for the reservoir gives an average value of  $0.25 \Omega$ . If the total pore volume of this reservoir is  $1 \times 10^8 \text{ m}^3$ , calculate the amount of oil reserves in the reservoir in barrels.  

(30 Marks)
2. A porous and permeable rock penetrated by an exploration well in the Mannar Basin has 12% porosity.
  - i. If the density log for the rock gives  $2.45 \text{ g/cm}^3$ , determine the main mineral that it is composed of. Assume that the rock is completely filled with water and made out of only one mineral.
  - ii. If the rock was filled completely with oil having a specific gravity of 0.8, what would be the value the density log record?
  - iii. What is the recovery factor expected for the rock?
  - iv. Describe the measures that can be used to enhance the oil recovery.

(30 Marks)

PART B

3. Answer any 4 of the following,
  - a. What is petroleum? Briefly describe the composition of crude oil.
  - b. Mention the world's petroleum producing regions. Which region owns the largest conventional oil reserves? List the top five countries having the highest conventional oil reserves in descending order.
  - c. Briefly describe the composition of natural gas. What is *casing head gas*?
  - d. What is API gravity? Briefly describe its applications.
  - e. Mention 5 different types of petrophysical/ wire line logs used in petroleum industry. Briefly describe their applications.
  - f. List the basic geological elements that should be combined to form a petroleum deposit.

(20 Marks)

4. Write short notes of any 5 of the following.

- i. Recoverable hydrocarbons
- ii. Stock Tank Oil Initially in Place (STOIIP)
- iii. Resources vs. Reserves
- iv. Advantages of drilling fluid
- v. Direct Hydrocarbon Indicators (DHIs)
- vi. Marine mineral resources

(20 Marks)

5. Describe in detail the key elements essential for the existence of an active petroleum system in a sedimentary basin.

(20 Marks)

6. Write a detailed description of polymetric nodules.

(20 Marks)

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