FEDERAL UNIVERSITY OF TECHNOLOGY, OWERRI
SCHOOL OF ENGINEERING AND ENGINEERING TECHNOLOGY
DEPARTMENT OF PETROLEUM ENGINEERING
2019/2020 RAIN SEMESTER EXAMINATION

Course Title: Introduction to Petroleum Engineering
Course Code: PET 202
Instructions: Answer Only 5 Questions. Start every new question in a new page. Write your serial number in the attendance sheet in your answer booklet. All questions carry equal marks.

Date: June 29, 2021
Time: 3 Hours
Units: 3

Question 1

a. Give three examples of bottom supported rigs and three examples of floating rigs:
b. Label the five (5) missing components A to E of the drilling rig (Figure 1) in the empty box below and state their functions
c. Give five (5) effects of a blow-out.
d. Explain the two types of lost circulation with examples for each type.
e. What is directional drilling and give two key reason why they are required/important.

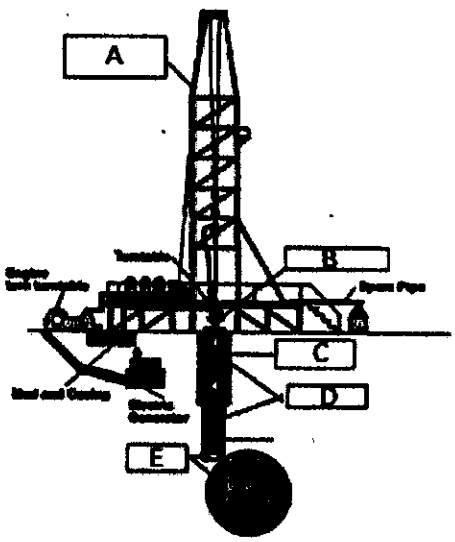

Figure 1:Drilling Rig

Question 2

a. In the Macondo blow-out in 2010, state a minimum of 4 things that went wrong and possibly led to the blow out.
b. What are the six most common drilling problems encountered while drilling an oil & gas well.
c. What are the 3 key causes of pipe sticking in a drilling operation
d. Define the term "kick" and "blowout" in a typical drilling operation
e. Provide four (4) events that can easily lead to a kick and/or blowout

Question 3

a. With a fully labeled diagram for 2-layer system, derive equations for travel time (i) Direct (T_D) (ii) Reflected ($T_{refl.}$) and (iii) Refracted ($T_{refr.}$) seismic waves
b. Write concise notes on: i) Kerogen ii) Catagenesis iii) Seismic prospecting iv) Gravimetry v) Magnetometry vi) Geochemical survey
c. Distinguish between the different proposed origins of petroleum?

Question 4

a. List four reasons for geological prospecting and exploration of oil and gas reservoirs?
b. With a tree diagram, show the three major types of traps and their subdivisions?
c. Explain the following: i) Basin ii) Petroleum pool iii) Oilfield iv) Petroleum play v) Petroleum province vi) Petroleum system vii) Prospect viii) Porosity ix) Permeability
d. Write concise notes on each of the elements of a petroleum system

Question 5

a. With the aid of diagrams, write notes on (i) Cased hole Completion (ii) Open hole completion (iii) Slotted Liner Completion
b. Draw a typical Inflow Performance Relationship curve and indicate on the curve the reservoir pressure and the absolute open flow
c. What do you understand by productivity index?
d. Determine the productivity index of a vertical well under steady state flow given the following data: $\beta_o = 1.12\ bbl/stb, K = 50\ md, h = 200\ ft, \mu_o = 0.8\ cp, r_e = 2960\ ft, r_w = 3.5\ in,\ S = 2.5$

Question 6

a. Write briefly on upstream, mid-stream and downstream sectors of the oil and gas industry
b. (i) State 3 functions of the wellhead (ii) What do you understand by Workover?
c. (i) Differentiate between associated and non-associated gas (ii) Distinguish between the two main stages of Natural Gas processing (iii) Explain the importance of natural gas processing prior to transportation in pipelines to consumers
d. Discuss the effects of (i) water vapor and (ii) acid gases in natural gas