`FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA
SCHOOL OF PHYSICAL SCIENCES
DEPARTMENT OF GEOLOGY
FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BTech GEOLOGY, 2015/2016 SESSION

COURSE: GEL 417 (PETROLEUM GEOLOGY) UNITS: 3

DATE: 14th April, 2016. DURATION: 2hrs 30 min

INSTRUCTIONS: Answer TWO Questions from each of Sections A and B.

SECTION A

1.(a) Explain the term"**overpressure**" and discuss it under the following headings: causes, detection, and its implications from petroleum exploration point of view.
(b) A well is drilled to 12,000 ft. The entrance into the abnormal pressures at **X**ft is caused by undercompaction. Calculate the value of **X** if the expected formation pressure at 12,000 ft is 6382.5psi, and determine the mud weightequivalent in pounds per gallon (ppg) at the same (12,000 ft) depth.
Assume formation fluid and overburden stress gradientsare 0.465 psi/ft and 1.0 psi/ft respectively.

2.(a)(i) Write concise notes on formation water under the following headings: characteristics and composition(ii) State five applications or values of formation water analysis.
(b) The analytical results of formation waters from four producing wells P – Sin the oilfield Y are summarized in the table below.

All concentrations are in milliequivalent per litre (meq)						
	Cations			**Anions**		
Wells	**Na^++K^+**	**Ca^{2+}**	**Mg^{2+}**	**Cl^-**	**Sulfate**	**Carbonate**
P	3100	79	22	3800	5	7
Q	3300	80	24	3900	6	8
R	1700	44	16	2200	38	13
S	1200	20	8	1000	20	24

Plot the data on the **stiff compositional diagram** provided in Figure 1 and interpret your diagram.

3.(a) Explain the term "**Petroleum Prospect**".
Briefly explain how a petroleum prospect can be evaluated.
(b) Discuss the importance of the following geophysical exploration methods:
(i) Magnetic method (ii)Gravity or gravimetric surveys (iii) Seismic reflection surveys

SECTION B

4.(a) What do you understand by the term "Oil Window"?
(b) Write a short note on geologic (age) distribution of petroleum.

5.Discuss the classification of sandstones with reference to their reservoir potentials.

6.(a) Differentiate between pools, petroleum field, petroleum province and sub-provinces. Give examples where necessary.
(b) What are the factors that affect porosity in clastic rocks?

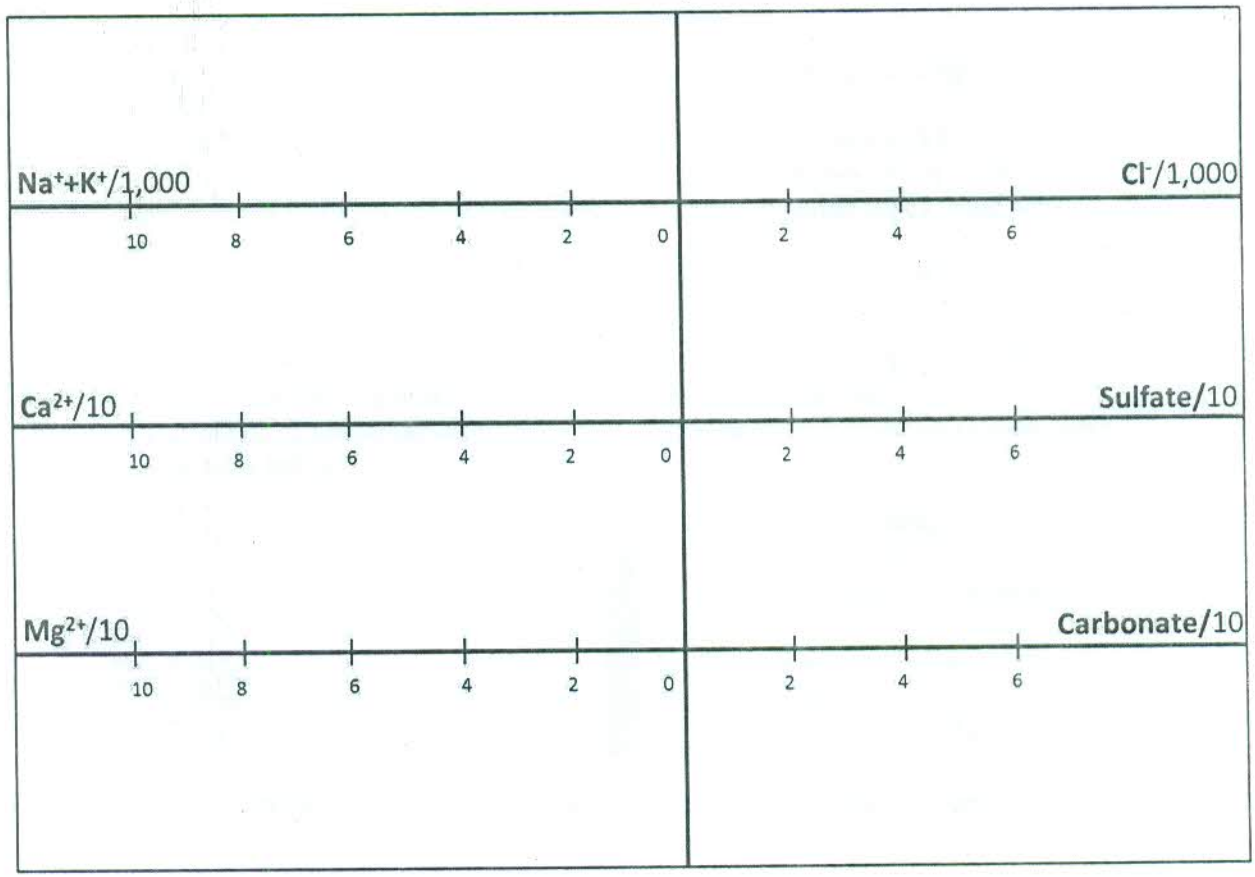

Figure 1: Stiff compositional diagram for comparing formation waters.