FEDERAL UNIVERSITY OF TECHNOLOGY, OWERRI
SCHOOL OF PHYSICAL SCIENCES
DEPARTMENT OF CHEMISTRY
RAIN SEMESTER EXAMINATION 2017/2018 SESSION **TIME: 2 HRS**
ICH 514: SURFACE CHEMISTRY OF MINERALS
Instruction: (1) Answer Four Questions only, and must include Q5
(2) Use Chemical equations and illustrations where appropriate.

Q1.(a) Define surface tension, and give its mathematical expression and meanings of your symbols.
(b) Explain the following terms:
(i) Adsorption and absorption, (ii) Adsorbate and adsorbent,
(iii) Physicosorption and chemisorption, (iv) Hydrophobicity, Aerophilicity and Hydrophilicity, with reference to froth floation.
(c) Give names and chemical formulae of two frothers.

Q2 (a) Use a well labelled diagram(s) to explain the meaning of "Contact Angle" for a solid-water-air flotation system at equilibrium.
(b) Outline with brief explanations:
(i) The characteristics of contact angle, (ii) The characteristics of frothers.
(c) What are emulsions?
(d) What actions that can be taken to reduce 'creaming'?
(e) Use block-diagram(s) to outline the various types of collectors.

Q3. (a) With clearly labelled diagrams/illustrations.
(i) Draw a typical flotation cell,
(ii) Describe the principles of froth floatation, and the specific roles of the collectors, frothers, regulators and modifiers.
(b) Give the mathematical expression of Gibb's adsorption isotherm, and explain the changes that arise in the surface tension on the surface of a liquid as a result of an added solute.

Q4 (a) With illustrations, discuss the electrical properties of colloids, and their effects on the stability of colloidal solutions.
(b) What is coagulation?
(c) Describe the mechanism of coagulation and flocculation processes by charge neutralization, bridges, precipitation, etc.
(d) Name and describe two (2) particle coagulants you know.

Q5. (a) Explain the differences between:
(i) Flocculation and coagulation (ii) Ores and minerals, and
(iii) Sols and gels in colloidal systems.
(b) (i) Explain: (i) HLB and (ii) Zero point of charge (ZPC).
(c) Discuss:
(i) The terms 'activators and depressants, and their intended functions in a froth flotation cell.
(ii) The use of emulsifying agents in emulsion formations.