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**UNIVERSITY EXAMINATIONS
2017/2018 ACADEMIC YEAR**

**THIRD YEAR FIRST SEMESTER
SUPPLEMENTARY/SPECIAL EXAMINATIONS**

FOR THE DEGREE OF B.ED (SCIENCE)

COURSE CODE: SCH 320

COURSE TITLE: ANALYTICAL CHEMISTRY II

DURATION: 2 HOURS

DATE: 19/10/2018

TIME: 11:30-1:30PM

INSTRUCTIONS TO CANDIDATES

- Answer **QUESTION ONE** (Compulsory) and any other two (2) Questions.
- Indicate **answered questions** on the front cover.
- Start every question on a new page and make sure question's number is written on each page.

This paper consists of 2 printed pages. Please Turn Over



1.

- a) Explain why separation techniques are necessary in the study of analytical chemistry. (2mks)
- b) Apart from change in physical state, name other physicochemical properties upon which separation and concentration of species are based. (4mks)
- c) You are required to separate components of a mixture based on change of physical state. Outline three techniques which you can use to accomplish this task. (3mks)
- d) Discuss the basis of size exclusion chromatography as a separation technique. (3mks)
- e) Explain how selectivity is achieved in solvent extraction
- f) Differentiate among the following as used in gravimetric analysis:
 - i. Electrogravimetry (2mks)
 - ii. Volatizationgravimetry (2mks)
 - iii. Particulate gravimetry (2mks)
- g) Controlling particle size is very vital in order to obtain a good precipitate. What are the stages involved in this process? (3mks)
- h) State two application of acid base titration. (2mks)
- i) Differentiate between column and planar chromatography. (4mks)

2.

- a) Thin layer chromatography is one of the chromatographic techniques commonly used by analysts. Discuss this technique under the following headings:
 - i. Principles (4mks)
 - ii. Solvents used (2mks)
 - iii. Applications (3mks)
- b) Discuss the instrumentation for gas chromatography. (5mks)
- c) State any four applications of HPLC. (4mks)

3.

- a) In order to determine the concentration of a standard an analyst can do it directly or indirectly. Explain how this can be done:
 - i. Direct method (4mks)
 - ii. Indirect method (4mk)
- b) Sketch a conductometric titration curve for a strong acid and a strong base (3mks)
- c) An analyst is required to carry out an experiment using 5 litres of 0.1M sodium carbonate. Advise the analyst how the solution should be prepared from a primary standard. (3mks)
- d) Redox titration is an important titrimetric technique. State its applications (6mks)

4.

- a) Batch and continuous extraction are methods used in solvent extraction. Briefly explain how each one of them works:
 - i. Batch extraction (5mks)
 - ii. Continuous extraction (5mks)
- b) The amount of solute remaining in the aqueous phase is readily calculated for any number of extractions with equal volumes of organic solvents from the equation

$$C_{(aq)n} = \left[\frac{V_{aq}}{DV_0 + V_{aq}} \right]^n \text{ define each of the terms in the equation. (5mks)}$$

- c) For a complete removal of 0.1g of iodine from 50cm³ of an aqueous solution of iodine and sodium chloride is required. Assuming D for carbon tetrachloride water is 85, then for a single extraction and three extractions with 25cm³ of CCl₄ calculate the amount of solute remaining in the aqueous phase. (5mks)