FINAL B. SC. EXAMINATION, 2017

(2nd Semester)

CHEMISTRY (HONOURS)

PAPER - XVIII

ANALYTICAL CHEMISTRY

Time : Two hours Full Marks : 25

Answer ***any two*** questions.

1. a) What are the main elements present in plain carbon steel? How do you determine tungsten (W) and vandaium (V) from it ? 3

   b) i) The four pK_a values of ethylenediaminetetra-acetic acid are $pK_1 = 2{\cdot}0$, $pK_2 = 2{\cdot}7$, $pK_3 = 6{\cdot}2$, and $pK_4 = 10{\cdot}3$ at 20^oC. Based on the pK_a values suggest a probable structure of ethylenediamine tetra-acetic acid. 1

   ii) Outline a procedure whereby the amount of sulphate in a sample can be estimated complexometrically. 2

   c) i) What is chelation therapy ? Give some examples of chelating ligand for clinical use. $1\frac{1}{2}$

   ii) What is smog ? Write the chemical reactions for smog formation. $1\frac{1}{2}$

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d) "Iron may be estimated quantitatively by gravimetric, volumetric (redox titration), complexometric, absorption and fluorescence spectrophotometric methods." Which method among these is most sensitive and why ? Give detail procedure and reactions. $3\frac{1}{2}$

2. a) Write down the composition of Manganese bronze. Write down the main reactions that are involved for the estimation of manganese both gravimetrically and colorimetrically. 3

b) i) How the cyanide complexes of zinc and cadmium can be demasked ? Give your answer with appropriate chemical reaction. 1

ii) Illustrate with an example how a metal ion indicator functions in a complexometric titration. 2

c) i) What is Boiler feed water ? Write the chemical reaction for two exchange resin process for the removal of hardness. 2

ii) What are COx, NOx and SOx ? How these binary composites are responsible for environmental pollution. $1\frac{1}{2}$

d) Calculate distribution ratio (D) for the extraction of metal ions (M^{n+}) using chelating extractant. 3

3. a) Write down the composition of brass. Describe estimation of antimony (Sb) and aluminium (Al) from the alloy. $3\frac{1}{2}$

b) What do you understand by 'stepwise' and 'overall' formation constants ? What is the relation between them ? 3

c) Write notes on ***(any one)*** : 3

i) Macrocyclic effect,

ii) Green techniques for dissolution of solid materials.

d) i) What are the physical and chemical pollution of water ?

ii) Write the full form of BAL and its structure.

iii) What is Benthos ? 3