**M. Sc. (Ag.) Examination 2016**

**Semester - I**

**Soil Science and Agricultural Chemistry**

**Course No: SSC-509**

**(Analytical Techniques and Instrumental Methods in Soil and Plant Analysis)**

**Time: Three hours** **Full Marks: 50**

*Questions are of value as indicated in the margin*

Answer any ***five*** questions

1. Differentiate between the following (with examples): (any **four**) 2.5X4=10
   a) Primary and secondary standard solution
   b) Polar and non-polar solvent
   c) Masking and de-masking reaction
   d) Potentiometric and conductometric titration
   e) Hot air oven and muffle furnace

2. Write short note on: (any **four**) 2.5X4=10
   a) Glass electrode for pH measurement
   b) EC meter
   c) Titre value
   d) Indicators in acid base titration
   e) Complexometric titration
   f) Conductometric titration curve of strong acid with strong base

3. A. Draw the tentative graphs and appropriate indicators used in the following titrations (any two) (2X2)+(2X3)=10
   a) NaOH and $H_2SO_4$
   b) HCl and $NH_4OH$
   c) $CH_3COOH$ and NaOH
   d) NaCl and $AgNO_3$

   B. Write down the preparation of the following solution (any three)
   a) 0.1 N 250 mL HCl
   b) 0.2 N 500 mL $K_2Cr_2O_7$
   c) 2 N 500 mL KCl
   d) 0.1 N 250 mL $KMnO_4$
   e) 0.01 N 500 mL $H_2SO_4$

4. a) Derive the fundamental equation of spectrophotometry by considering Beer Law and Lambert Law. 4+3+3=10
   b) What are the instrumental components of spectrophotometer?
   c) What are the steps of measurement of the concentration of a solution using spectrophotometer?

5. Write the principle, instrumentation (with sketch diagram) and application of atomic absorption spectrophotometer (AAS). 10

6. Discuss in details the methods of sampling, processing, and digestion of plant samples for the analysis of N, P and K content in food grain/leaf. 10

7. Discuss in details the application of radiotracer techniques in soil plant analysis. 10

8. a) What do you mean by potentiometric titration? 1+2+(3+4)=10
   b) What are the advantages of potentiometric titration over classical visual indicator methods?
   c) Describe the general principle and types of potentiometric titration.

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