This question paper contains **2** printed pages]

Roll No. | | | | | | | | | | | |

S. No. of Question Paper : **80**

Unique Paper Code : **217367** **G**

Name of the Paper : **ACPT-303 : Analytical Chemistry-III**

Name of the Course : **B.Sc. (Prog.) App. Phys. Sc. (Analytical Chemistry)**

Semester : **III**

Duration : **3 Hours** Maximum Marks : **75**

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt *five* questions in all.

All questions carry equal marks.

Use of scientific calculator/log tables is permitted.

1. (*a*) Derive Henderson-Hasselbalch equation.

   (*b*) What is redox titration ? Explain the role of phosphoric acid in the titration of Mohr's salt with potassium dichromate.

   (*c*) What are acid-base indicators ? Explain the mechanism of action of phenolphthalein as an acid-base indicator. 5,5,5

2. (*a*) The gravimetric estimation of 30 mL of Ni(II) salt solution yields 0.3 g Ni-DMG precipitate. What is the strength of Ni(II) ? The molecular mass of Ni is 58.69 g and that of Ni-DMG is 289 g.

   (*b*) Explain briefly the different types of EDTA titrations.

   (*c*) A 0.1 M solution of hydrazoic acid has pH of 2.83 Find pK_a of this acid. 5,5,5

P.T.O.

3. (*a*) What is relative super-saturation ? How can it be varied during precipitate formation ? What are the conditions of relative super-saturation for obtaining colloidal and crystalline precipitates ?

(*b*) The solubility of CaF_2 in water at 20°C is 15.6 mg per dm^3 of solution. Calculate the solubility product of CaF_2.

(*c*) What are masking and de-masking agents ? How are these agents used in the estimation of Cu^{2+}, Cd^{2+} and Ca^{2+} ions present in a mixture ? 5,5,5

4. (*a*) Explain the nucleation process. How rate of nucleation and crystal growth control the number and size of precipitating particles ?

(*b*) Write short notes on any *two* of the following : 5,5,5

(*i*) Precipitation titration

(*ii*) Buffer capacity

(*iii*) Common ion effect.

5. (*a*) Derive the correlation between sedimentation rate and particle size.

(*b*) Define Relative centrifugal force. An ultracentrifuge is operated at a speed of 40,000 r.p.m. What is the angular velocity (ω) in radians per second ?

(*c*) How many types of Density Gradient Centrifugation ? Explain with the help of suitable diagram. 5,5,5

6. (*a*) How do chlorofluorocarbons attack stratosphere ? What are the environment friendly substitutes suggested for CFCs ?

(*b*) What do you mean by primary, secodary and tertiary treatment for purification of waste water in the sewage treatment plant ? Discuss the various physical and chemical processes used in secondary treatment.

(*c*) Mention common causes of nuclear accidents and describe *one* such incident. 5,5,5