M.Sc. Semester—III (CBCS) Examination

CHEMISTRY (New)

Paper–X

Analytical Chemistry–I (Thermal and Electroanalytical Methods)

Time : Three Hours] [Maximum Marks : 80

N.B. :— (1) All questions are compulsory.

(2) All questions carry equal marks.

(3) Use of calculator is permitted.

(4) Draw labelled diagrams wherever necessary.

UNIT—I

1. (a) Explain the principle and technique in DTA. 6

(b) Explain the working principle of DSC. 5

(c) A mixture containing MgO and $MgCO_3$ undergoes a maximum weight loss of 15.6% by decomposition forming CO_2. Calculate the weight percentage of each of the two components in the mixture. 5

OR

(p) What are the thermal methods of analysis ? Give the classification of thermal methods of analysis. 6

(q) Explain various factors affecting DTA curves. 5

(r) Discuss the principal and different types of thermometric titrations. 5

UNIT—II

2. (a) Explain the principle and instrumentation in coulometric analysis. 6

(b) Discuss the various applications of high frequency titration. 5

(c) Explain the principle involved in electrogravimetric estimation of binary mixture of metals. 5

OR

(p) Explain Coulometric titrations and give their advantages. 6

(q) Discuss the various applications of high frequency titration. 5

(r) Explain the principle and technique in electrogravimetric analysis. 5

UNIT—III

3. (a) Explain construction and working of Glass electrode. How pH can be determined by this electrode ? 6

(b) What are ion selective electrodes ? Explain working of sodium ion selective electrode. 5

(c) Give explanatory note on bio-sensors. 5

OR

(p) Write brief notes on :

(i) Electrochemical Sensor

(ii) Potentiometric Sensor. 6

(q) What are the applications of chemical sensors in agricultrue and biotechnology ? 5

(r) Give the principle involved in ion selective electrodes. What are their advantages and limitations ? 5

UNIT—IV

4. (a) Explain types of currents in polarography. 6

(b) Write short note on "Supporting electrolyte" in polarography. 5

(c) Explain the principle of cyclic voltametry and give its applications. 5

OR

(p) Define "Polarographic Maxima". How is it removed ? 6

(q) Calculate the diffusion coefficient of an ion that gives diffusion current of 10 μA in a cell with following properties. n = 2, t = 3.02 s, m = 4.3 mg/s, C = 10 mM. 5

(r) What are amperometric titrations ? Explain its principle and methodology. 5

UNIT—V

5. (a) Discuss the applications of spectrophotometry in biomolecular analysis with suitable example. 6

(b) What is meant by assay ? Discuss in brief method of dry assay. 5

(c) Discuss the principle and nature of various types of gels. 5

OR

(p) How will you determine low quantity of Vitamin B_1 from food stuff by spectrofluorometry ? Explain in brief. 6

(q) Discuss various applications of ultracentrifugation. 5

(r) Write brief account on heavy metal toxicity and their remedy. 5