QP Code : 34394

(2½ Hours) **[Total Marks : 75**

N.B. 1. **All** questions are **compulsory**.
2. **Figures** to the **right** indicate **full** marks.
3. Use of l**og tables** /**non-programmable** calculator is **allowed**.

1. Attempt any **three** of the following :–

(A) Explain the determination of equivalence point in potentionmetric titrations using the graph of – **5**

(i) $\Delta E / \Delta V$ versus V, and

(ii) $\Delta^2 E / \Delta V^2$ versus V

(B) A 1.222×10^{-3} M solution of polyvalent ions having diffusion coefficient 0.69×10^{-5} cm^2 s^{-1}, when reduced polarogrphically, gave a diffussion current of 7.168×10^{-6} A, with a mercury flow rate of 2.34 mg s^{-1} and a drop time of 4.3 s. Calculate the number of electrons transferred per ion in the reduction reaction. **5**

(C) The diffusion coefficient of oxygen in aqueous solution is 2.65×10^{-5} cm^2 s^{-1}. A DME with $m^{2/3}$ $t^{1/6}$ of 1.86 was used to assay a natural water sample. The diffusion current of the first oxygen wave was 2.3 µA. Calculate the concentration of dissolved oxygen in the water. **5**

(D) Give any three advantages and two limitations of amperometric titrations. **5**

(E) Explain the basis of qualitative and quantitative polarography. **5**

(F) Discuss the nature of amperometric titration curve when : **5**
(i) titrant alone in reducible, and
(ii) titrand alone in reducible.

2. Attempt any **three** of the following :

(A) Discuss the role of pH in preservation of food. **5**

(B) Describe a method for determination of sodium benzoate as a preservative in food. **5**

(C) Explain a method for analysis of lactose in milk. **5**

(D) Mention the constituents and composition of coffee, explaining the role of chicory in coffee. **5**

(E) Write the constituents of lipstick. Discuss the ash analysis of lipstick. **5**

(F) What are antiperspirants and deodorants ? Write the constituents and any two properties of antiperspirants and deodorants. **5**

[TURN OVER

3. Attempt any **three** of the following :

(A) With the help of a neat diagram, explain the working of an electron capture detector in GC, with any two advantages. **5**

(B) The following data was obtained using liquid chromatographic column of 250 mm length. Component A and B were found to have retention time 6.0 min and 12.3 min respectively. The peak width at the base for component A was 30.6 s and for B was 79.2 s Calculate the number of plates for each peak and the plate height for the column. **5**

(C) Give the comparison between GSC and GLC. **5**

(D) Define the term ion exhange capacity. How is the capacity of cation exchanger determined experimentally ? **5**

(E) How is demineralisation of water and separation of amino acids done using ion-exchange chromatography ? **5**

(F) Discuss column material and column packing w.r.t. size exclusion chromatography. **5**

4. Attempt any **three** of the following :

(A) What is a thermogram ? Discuss the factors influencing thermogram. **5**

(B) Discuss basic principle of DTA. **5**

(C) What are thermometric titrations ? Explain its application in the titration of Zn^{2+} versus disodium tartarate. **5**

(D) Draw schematic diagram of thermobalance and explain the function of its components. **5**

(E) What are advantages and limitations of NAA ? **5**

(F) Discuss DTA curve of **5**

(i) $Ca\ C_2O_4 \cdot H_2O$, and

(ii) $CuSO_4 \cdot 5H_2O$.

5. (A) Fill in the blanks : **4**

(a) Diffusion current is the _____ current observed in polarography, when the magnitude of the current is limited only by the rate of diffusion of the reactant to the DME surface.

(b) The mass of 20 drops of mercury was found to be 0.132 g and the drop time was 4.94 s. Hence flow rate of mercury from capillary = _____.

(c) Three electrode system in polarography employes _____ as a working electrode.

(d) Potentiometric titration involves measurement of potential as a function of _____ of titrant.

OR

(A) State **true** or **false** : **4**

(p) A nonfaradic current is the charging current that produce a charged double layer across electrode / solution interfaces.

(q) Excess of maxima suppressor can diminish polarographic wave.

(r) Potentiometric titration cannot be used for turbid solution.

(s) Polarographic technique can be used for determination of stability constant of the complexes.

5. (B) Fill in the blanks : **4**

(a) Chemically, talc is _____ .

(b) The role of titanium oxide in face powder is to reflect _____ light.

(c) Green tea has _____ amount of caffeine than coffee.

(d) Primary component of vinegar which acts as perservative in slightly acidic food is _____ .

OR

(B) State **true** or **false** : **4**

(p) Food treated with irradiation becomes radioactive itself.

(q) Tannin present in tea leaves in water insoluble.

(r) Pasterurisation method of preservation is same as sterilisation.

(s) Honey contains more amount of fructose than glucose.

5. (C) Fill in the blanks : **4**

(a) Time required to elute a solute from the column in gas chromatography is called as _____ time.

(b) In ion exchange chromatography, the functional group that is responsible for exchange of ions is called as _____ ion.

(c) In an ion exchange chromatography, higher the concentration of ions in solution _____ is the exchange.

(d) In size exclusion charomatography, larger molecules are retained on the column for _____ time than smaller molecules.

OR

(C) State **true** or **false** :– **4**

(p) Gas chromatography can be used for analysis of thermally unstable compounds.

[TURN OVER

(q) In ion exchange chromatography, the stationary phase is a solid.

(r) Trace metal ions in sea water can be concentrated using ion exchange chromatography.

(s) Size exclusion chromatography is used to separate large molecules of biological origin.

5. (D) Fill in the blanks : **3**

(a) TGA is a technique in which change in _____ of the substance is recorded as a function of time or temparature .

(b) In the expression, $A_t = N \phi \sigma (1 - e^{-\lambda t})$, ϕ stands for _____.

(c) Thermogram obtained in thermometric titration of boric acid versus NaOH shows _____ end point.

OR

(D) State **true** or **false** :– **3**

(p) NAA cannot be used for detection of trace impurities in Si and Ge samples.

(q) Temparature difference between the sample and the reference material, in DTA, is measured by furnace temparature programmer.

(r) Neutron flux is number of neutrons per sq. m per second.

_____