**Q.P. Code :04776**

**[Time: 2 $\frac{1}{2}$ Hours]** **[ Marks:75]**

Please check whether you have got the right question paper.

N.B:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Use of log table/non programmable calculator is allowed.

Q.1 Answer **any three** of the following. 15

A) Draw a labelled polargram and explain any two terms involved in it.

B) Determine the concentration of $Pb^{2+}$ ions, which produces a diffusion current of 21.64 µA in 0.1M KCl at 298K, with the rate of flow of mercury drops and drop time as 3.4 mg $s^{-1}$ and 4 s respectively. Given: D= 9.8 x $10^{-6}$ $cm^2$ $s^{-1}$.

C) In a polarographic determination of lead, the wave heights determined for a series of solution were as follows.

| Concentration of $Pb^{2+}$ (mM) | 0.25 | 0.40 | 0.50 | 0.65 |
|---|---|---|---|---|
| Height of wave (mm) | 31.2 | 49.5 | 62.5 | 79.9 |

A sample solution containing unknown amount of lead gave a wave height of 46.3 mm, under the identical condition. Find the concentration of lead in the sample solution.

D) Discuss the nature of potentiometric titration curve from the graph of:

i) $\frac{\Delta E}{\Delta V}$ vs. $V$ , and

ii) $\frac{\Delta^2 E}{\Delta V^2}$ vs. $V$

E) Explain the basic principle of amperometric titrations. Discuss the nature of amperometric titration curve when titrand alone is reducible, with suitable example.

F) Mention the advantages and limitations of rotating platinum electrode.

Q.2 Answer **any three** of the following. 15

A) What is food processing and food preservation? Why is it necessary to preserve food?

B) Discuss any one method for the estimation of reducing sugars in honey.

C) Explain the estimation of boric acid as a food preservative.

D) Give a brief account of different types of milk.

E) What are deodorants and antiperspirants? Mention any two properties of each.

F) What is the composition of face powder? How is calcium estimated in face powder?

**(TURN OVER)**

Q.3 Attempt **any three** of the following. 15

A) With the help of a labelled diagram, explain the working thermal conductivity detector, giving any two of its advantages.

B) The following data was obtained on using chromatographic column of length 20 cm. The unretained species had retention time of 1.30 min. Retention time for the two components A and B were 10.5 min and 12.2 min respectively. The corresponding peak width at the base for components A & B were 1.25 min and 1.30 min respectively. Calculate the number of plates in each peak and plate height for the column.

C) Mention any two factors which affect the choice of carrier gas in GC. Give any three of its applications.

D) What are the requirements of an ideal ion-exchange resin?

E) Define ion exchange capacity. Discuss the determination of capacity of an anion exchanger.

F) What are the applications of size exclusion chromatography?

Q.4 Answer any **three** of the following. 15

A) Discuss various factors influencing the TG curve.

B) Draw a neat labelled diagram of DTA instrument and explain any three of its components.

C) What is DTA? Discuss the nature of DTA curve for decomposition of **$CaC_2O_4$ $H_2O$**.

D) Distinguish between TGA and DTA.

E) Discuss the theory of neutron activation analysis.

F) What are thermometric titrations? Discuss the application of thermometric titration in the titration of $Zn^{2+}$ against disodium tartarate.

Q.5 A Fill in the blanks. 04

a) Three electrode system consist of working electrode, _____ electrode and a reference electrode.

b) The dissolved oxygen present in experimental solution in acidic medium, finally gets reduced to _____at DME.

c) _____equation forms the basis of quantitative analysis in polarography.

d) Potentiometric titrations involve the measurement of potential as a function of _____ of titrant.

**OR**

A State true or false. 04

p) Polarography can be used as a basis of amperometric titration.

q) Excess of maxima suppressor in polarography tends to reduce the diffusion current.

**(TURN OVER)**

r) Potentiometric titrations cannot be applied to non-aqueous solution.

s) Electrolyte added to polarographic solution to eliminate diffusion current is supporting electrolyte.

Q.5 B Fill in the blanks. 04

a) _____is used as a preservative in poultry.

b) Irradiation of food products is carried out by exposing them to _____rays.

c) Chicory gives _____ taste to coffee.

d) Kaolin is used in face powder for _____

**OR**

Q.5 B State true or false. 04

p) LTLT method involves heating of the milk to $72^0$C for at least 15 sec.

q) Tannin in tea is estimated by determining its oxidizability by potassium permanganate solution.

r) Dyes like fluorescein are used in lipsticks.

s) Fermentation is a process where pathogenic microorganisms promote chemical changes in food.

C Fill in the blanks: 04

a) As the number of theoretical plates in the GC column increases, the efficiency of the column_____

b) In ion-exchange chromatography, higher the concentration of ions in solution, _____ is its exchange.

c) In ion-exchange chromatography, larger the value of selectivity coefficient, _____ is the affinity of the ions for the resin.

d) Size exclusion chromatography involves the separation of molecules based on their_____.

**OR**

Q.5 C State true or false. 04

p) Molecular sieves are used as adsorbents in open tubular GC column.

q) The rate of solute migration in a GC column is a function of its partition coefficient.

r) Clays can be used as natural ion-exchangers.

s) Swelling of the resin is due to high proportion of non- polar groups.

Q.5 D Fill in the blanks. 03

a) Horizontal plateau in TG curve indicates the regions where there is no _____ loss.

b) Silicon carbide is used as a _____ material in DTA.

**(TURN OVER)**

c) Thermometric titration graph of HCl versus NaOH gives _____ end point.

**OR**

Q.5 D State true or false. 03

p) NAA is used for the detection of trace impurities in Si and Ge samples used in transistor.

q) NAA is a highly sensitive technique and permits the estimation of elements up to picogram level.

r) Chemical reactions, particularly those of oxidative nature are predominantly endothermic.

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