08/04/24 TYBSC-VI

(Time: 3 hours) Total Marks: 100

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 **Attempt any four of the following.** 20

A) (a) What is a polarogram? Draw a polarogram and label all the different regions.
(b) Explain- half wave potential and its significance.

B) Explain the construction and working of dropping mercury electrode with a neat labelled diagram.

C) Explain the term polarographic maxima with a neat diagram. How is it eliminated?

D) A 5×10^{-4} M solution of Ba^{2+} ion in 0.1 M KCl as a supporting electrolyte gave a diffusion current of 4.1 μA . If the rate of flow of mercury drops and the drop time is 1.5 mgs^{-1} and 3 second respectively. Calculate diffusion coefficient of Ba^{2+} ion.

E) Explain the nature of amperometric titration curves when,
i) titrant is reducible but other species are not.
ii) both titrant and titrand are reducible.

F) Draw a labelled diagram of rotating platinum electrode.
Give the advantages and limitations of amperometric titrations.

Q.2 **Attempt any four of the following.** 20

A) Explain the following terms: i) retention time ii) retention volume

B) Draw a neat and labelled schematic diagram of gas-liquid chromatography. Give any three requirements of carrier gas.

C) Name the detectors used in gas chromatography. Explain any one detector with the help of a labelled diagram.

D) What are ion exchange resins? What are the requirements of a good ion exchange resin?

E) If the two separated components A and B have retention times 4.45 min. and 6.36 min. respectively. If the peak widths at half peak heights of A and B are 0.22 min. and 0.33 min. respectively. Calculate the number of theoretical plates for each peak.

F) With reference to ion exchange chromatography explain the following applications-
1) Demineralisation of water
2) Separation of Amino acids

Q.3 **Attempt any four of the following.** 20

A) Explain the physical method of food preservation with reference to
(i) Pasteurisation
(ii) Irradiation

B) Give the composition of milk. Discuss the nutritive value of milk.

C) Explain the Lowenthal's method to estimate tannin in tea.

D) Give the composition of Coffee. What is the role of chicory in Coffee?

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E) Give the constituents of Face Powder. What are the characteristics of Face Powder?

F) What are cosmetics? Give the differences between deodorant and antiperspirant.

Q.4 Attempt any four of the following. 20

A) Give the applications of thermogravimetry.

B) Draw a neat and labelled diagram of thermobalance. Discuss any three components of it.

C) Explain the principle of DTA. Discuss DTA curve of $CaC_2O_4.H_2O$ with respect to curve, reactions and decomposition temperature.

D) Give the characteristics of reference material used in DTA. Mentioned name of any four reference materials used in DTA.

E) Define thermometric titration. Discuss the thermometric titration for Complexometric titration in determination of Calcium and Magnesium

F) Discuss any five parameters used in method validation process.

Q.5 A) Select the correct option and complete the following 05 statements: (any five)

a) The electrode which has its own potential and cannot take up potential applied on it is called _____.
   i) dropping mercury electrode   ii) non-polarizable electrode   iii) rotating platinum electrode

b) In polarography, KCl is used to _____ . migration current.
   i) Eliminat   ii) increases   iii) maintain

c) The potential at the point on the polarography wave where $i = i_d/2$, is termed as_____.
   i) Half wave current   ii) Half wave potential   iii) decomposition potential

d) _____ is directly proportional to the concentration of metal ion.
   i) Diffusion current   ii) Residual current   iii) limiting current

e) _____ . is used as maxima suppressor in polarography.
   i) KCl   ii) Gelatin   iii) Pool of mercury

f) Rotating platinum is used in amperometric titration as _____. electrode
   i) reference   ii) working   iii) combined

g) In amperometric titration of Zn^{2+} determined by titrating with_____.
   i) dimethyl glyoxime   ii) silver nitrate   iii) EDTA

h) When titrand is reducible but titrant and product are not in amperometric titration shows _____.
   i) constant current till the equivalence point, then increases.
   ii) decrease in current till the equivalence point, then constant
   iii) increase in current till the equivalence point, then decreases

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Q.5 **B)** State whether true or false: (any five) 05
a) Separation of components in gas-liquid chromatography occurs by differential adsorption.
b) The choice of the detector does not depend on the carrier gas.
c) The smaller the magnitude of plate height, the higher is the efficiency of the column.
d) The response of the detector in gas chromatography should be linear.
e) An anion exchanger contains a carboxylic functional group.
f) Styrene on polymerization produces linear polymers.
g) The unit of ion exchange capacity is milliequivalent/gm

Q.5 **C)** Fill in the blanks with correct alternatives given in the bracket: 05
(any five)
(glucose oxidase, 63°C and 72°C, Lipstick, magnesium silicate, quality, deodorant, methylene blue, irradiation)
a) Food processing improves the _____ value of food.
b) Raw honey contains the enzyme _____
c) _____ prevents/controls body odour.
d) _____ is a physical method of food preservation.
e) Pasteurization of milk is carried out at _____
f) For determination of reducing sugars in honey, by Cole's ferricyanide method _____ is used as an internal indicator.
g) _____ mainly consists of an oily base material and colouring agent
h) Chemically talc is _____.

Q.5 **D)** Match the columns: (any five) 05

A		B	
i)	Thermometric titration	(a)	ΔT plotted against sample temperature
ii)	Thermogravimetric analysis	(b)	Closeness of obtained value to true value
iii)	Double pan used	(c)	Reference standard
iv)	Accuracy	(d)	Exotherm
v)	DTA curve	(e)	Weight change measurements
vi)	MgO	(f)	Adiabatic condition
vii)	Air oxidation	(g)	DTA

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