

Date: 13-12-2022 (1pm)

Registration number:

**ST. JOSEPH’S UNIVERSITY, BENGALURU-27**

**M.Sc. ENVIRONMENTAL SCIENCE AND SUSTAINABILITY**

**I-SEMESTER EXAMINATION: OCTOBER 2022**

(conducted in DECEMBER 2022)

**ESS 7522: ENVIRONMENTAL CHEMISTRY AND ANALYTICAL METHODS**

**TIME: 2 HOURS MAX MARKS: 50**

**This question paper contains TWO printed sides and THREE parts**

**Draw diagrams and write examples wherever necessary**

**You are provided with a graph sheet.**

**PART – A**

**Answer any five of the following: 5 X 2 = 10**

1. Write any four requirements of a primary standard titrant.
2. What are adsorption indicators. Write one example.
3. Write an expression for conditional formation constant.
4. Mention any two applications of inductive coupled plasma analysis.
5. Define the following terms used in UV-visible spectroscopy.

a) chromophore and b) auxochrome.

1. Among the following pairs which one would absorb infrared radiation at higher frequency?
2.  or 
3.  or 
4. Mention any two advantages of potentiometric titrations over indicator-based titrations.

**PART – B**

**Write explanatory notes on any four of the following 4 X 5 = 20**

1. Explain the applications of acid base titrations.
2. What are masking and demasking in titrations explain with examples.
3. Discuss the use of potassium permanganate in chemical estimations.
4. Arrange the following functional groups according to their increasing order of carbonyl stretching frequency and justify.
5. aldehydes b) esters c) ketone d) amides e) carboxylic acids f) acyl chlorides
6. Give reasons for the following:
7. Isooctane is a better solvent than ethanol for UV-visible study of phenols.
8. Expensive ‘quartz cuvette’s’ are used in UV studies.
9. Give the working principle of Atomic Absorption Spectroscopy.

**PART – C**

**Answer all the questions 2 X 10 = 20**

1. a) 10 cm3 of 0.1M CH3COOH is titrated against following volumes of NaOH.

0.0, 9.0, 10.0, 11.0, 20.0 cm3 (given: Ka=1.8X10-5). Plot this on a graph sheet and indicate the regions of indicator action of phenolphthalein and methyl orange.

**OR**

b) Discuss the principle, various stages and applications of gravimetric methods of analysis.

1. a) Propose the structure that is consistent with each set of H-NMR data.

i) C4H10O δ (ppm) splitting integration

1.28 s 9H

1.35 s 1H

ii) C4H9Br 1.04 d 6H

1.95 m 1H

* 1. d 2H

**OR**

b) Explain the principle, working and applications of i) Geiger-Muller counter ii) Scintillation counter.

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